

INSTITUTIONAL AND POLICY ANALYSIS OF RIVER BASIN MANAGEMENT

The Brantas River Basin, East Java, Indonesia¹

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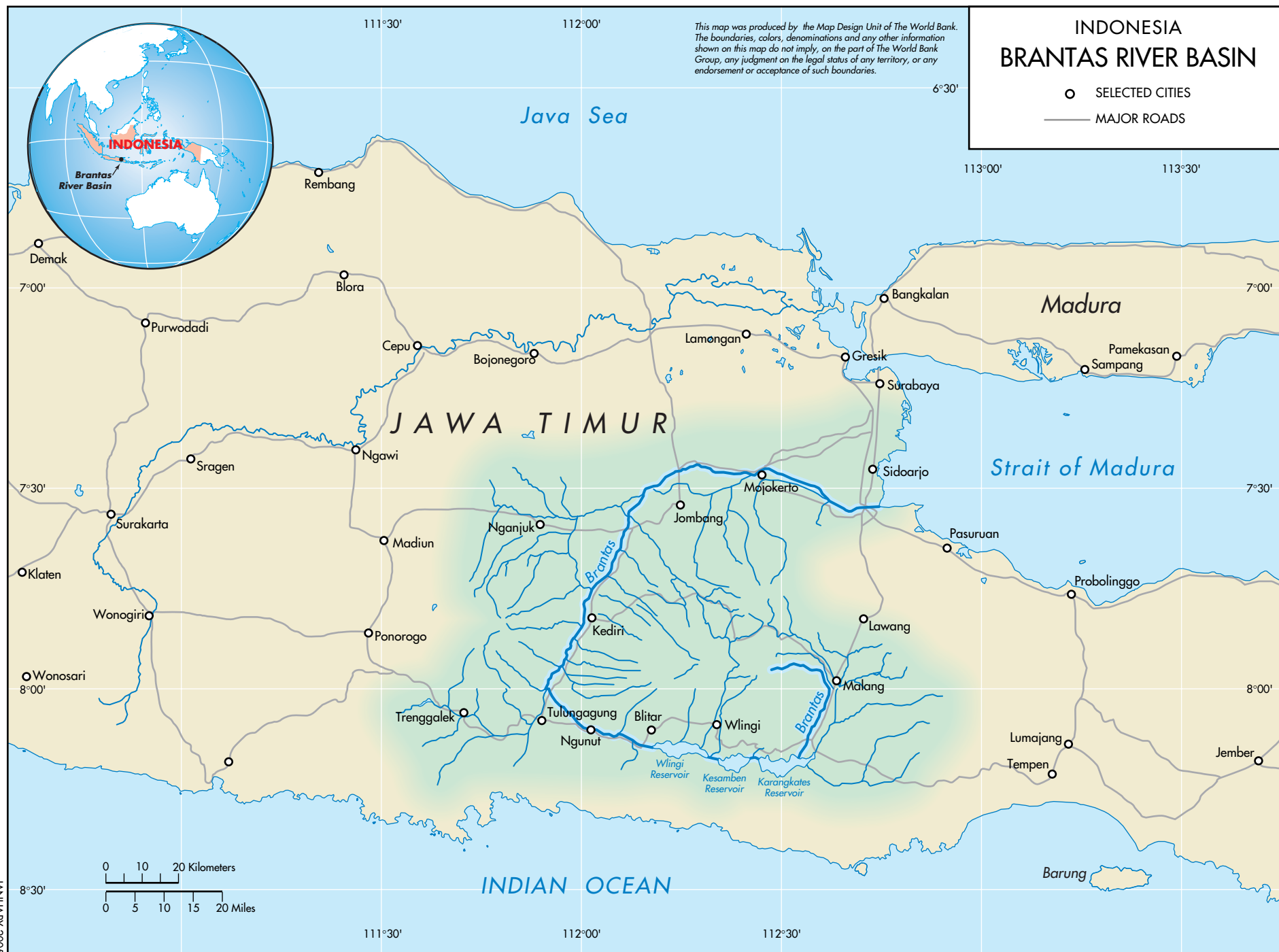
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1. Background and Introduction

Integrated water resources management (IWRM) and organizing it primarily at the river basin level are two of the most common and widely repeated recommendations in the water resources literature of the last decade if not longer (Allee 1988; Galloway 1997; McDonald and Kay 1988; World Bank 1993). Basin management, which was previously assumed to be best undertaken through centralized arrangements, has come to be associated with the concept of decentralization, of managing water resources at the “lowest appropriate level.” (See, e.g., International Conference on Water and the Environment 1992; Mody 2001.) Several conceptual arguments have been presented in favor of decentralization in water resources management, and basin-level management in particular, including that the entire array of resources and use patterns in the basin will be taken into account, management decisions will be based on better knowledge of local conditions, and public participation will be greater and broader.

Empirical studies of river basin management systems provide opportunities to examine the claims made for basin-level water resources management, and to explore factors that influence its implementation and outcomes. In this research project those factors and their relationships to river basin management have been explored in two ways: with a survey of river basin organizations throughout the world, and with case studies of eight river basins analyzed in greater detail. Some of those eight cases have long histories of basin-scale institutions for water resource management, such as the Guadalquivir river basin in Spain and the Murray-Darling river basin in Australia. Others were established more recently, as in the Brantas basin of Indonesia, where a river basin corporation, the Brantas River Basin Public Corporation, the subject of this study, was established in 1990.

Indonesia shares the problems and issues of many developing countries pursuing a path of rapid economic growth. While Indonesia is rich in resources and has plentiful water supply at the outset, on a number of islands of the archipelago water resources have come under increasing pressure in recent years and are facing deterioration in quality and quantity due to the socio-economic forces causing this deterioration. Indonesia is among many developing countries to face water shortage due to degrading water quality (United Nations 1997). Industrialized countries have faced such water resource issues as pollution, eutrophication, toxicity development, ecosystem dysfunction and acidification over a long period of time and in sequence. Indonesia, like other developing countries, is facing these problems simultaneously, and has recognized the need to develop a program to manage water resources at the river basin level to address water quality and scarcity issues in the next 25 years.

The Brantas River Basin area of East Java is an economically developed region of Indonesia of great national interest. Central government line agencies have been involved with water infrastructure development in the Brantas basin for over three decades for purposes of flood control and regularization of supply for irrigation, industry, and power generation. The establishment of the Brantas River Basin Management Corporation, or Perum Jasa Tirta I (PJT I), in 1990 placed emphasis on the management aspects of water resources at the river basin level, rather than primarily on water and infrastructure development.

An examination of institutions for river basin management within the Brantas basin is of great value to the larger global comparative study. It illustrates the prospects and challenges of creating and embedding arrangements for integrated water resources management in a developing country undergoing rapid economic, political, and institutional change. Much can be learned from the process and outcomes to date of Indonesia's historically centralized central government's efforts to introduce river basin management, as well as its recent efforts to proactively adapt its basin management institutions to comprehensive political, administrative, and fiscal decentralization reform of its public administration system.

This framework comprises developing and supporting river basin management as an important component of advancing the integrated management of water resources in the Brantas basin through a multi-tier framework of institutions which were originally partly managed directly by the center and partly by deconcentration of national government powers and now are being decentralized with water resources management regulatory powers vested in the East Java provincial and district governments. This framework includes: (a) PJT I as a public revenue-generating corporation with a concession to serve as a bulk supplier of water from the Brantas River and its larger tributaries and, as a management and maintenance organization for major publicly-owned infrastructure in these rivers; (b) the East Java provincial government's Basin Water Resources Management Units (Balai PSDA) for management of water resources and river infrastructure O&M in the basin's lesser rivers; (c) irrigation management within irrigation schemes by units of the provincial and district governments; (d) regulation of water allocation and water quality through provincial and district government water resources and environmental units; (e) development and rehabilitation of major infrastructure by a centrally funded construction organization (Proyek Brantas); (f) a Basin Water Resources Management Committee (PPTPA) with stakeholder government units and PJT I membership that will become a Brantas Basin Water Resources Council (with non-government stakeholder membership) for inter-agency coordination, recommendations to the Government of East Java of basin management policy (to be followed by PJT I and the various Balai PSDA in the basin) and resolution of issues; and (g) a Provincial Water Resources Management Implementation Committee (PTPA) that sets provincial policy and resolves broad issues². Whereas PJT I is represented on both the PPTPA and PTPA, its activities (and those of the Balai PSDA) are governed, regulated and coordinated by the provincial government agencies (such as the Provincial Public Works Agency or Dinas PUP, Provincial Environmental Agency or BAPEDALDA, etc.) and are subject to government as well as non-government stakeholder views.

² The PTPA will become a Provincial Water Resources Council with non-government stakeholder representation upon issuing of a new Provincial Regulation to implement the 2004 Water Resources Law.

2. Analytical Framework

To analyze the data gathered for this project from the case studies and from the survey of river basin organizations, a framework has been developed that identifies a number of political and institutional factors which may be associated with the emergence, sustainability, and success or failure of decentralized approaches to integrated water resource management at the basin scale. These factors and their hypothesized relationships with basin management in a country that has decentralized or is attempting to decentralize water resource management institutions are derived from the institutional analysis literature relating to water or other natural resource management and to decentralized systems (especially Ostrom 1990, 1992; also Agrawal 2000; Alaerts 1999; Blomquist and Schlager 1999; Bromley 1999; Easter and Hearne 1993; Wunsch 1991).

For brevity, we present these political and institutional factors in an outline fashion, gathered under four headings. Our information gathering and analysis focus on the following sets of variables:

- Contextual factors and initial conditions
- Characteristics of the decentralization process
- Characteristics of central government/basin-level relationships and capacities
- The internal configuration of basin-level institutional arrangements.

Variables considered within each set are listed in the appendix . The Brantas basin case is discussed in terms of these categories and variables in Section 7 below.

3. Methodology

A case study approach for this project was chosen in order to examine closely the processes of institutional change as well as the current situation of water resources management in the basin. The site visit was facilitated by an expert and active participant in water policy and management affairs in the Brantas basin and within Indonesia and interviews with basin authority officials and other basin stakeholders were held during a week-long visit. A consultant with extensive experience observing the institutional developments within Indonesia and the Brantas River Basin prepared a background paper on the basin prior to the visit. The semi-structured interviews were conducted with a focus on understanding the processes of institutional change and the performance of water management institutions at sub-basin, basin, and national scales, matters that were closely within the knowledge of the interviewees. The semi-structured nature of the research allowed for flexible and consistent investigation of issues as they emerged.

The following analysis of the Brantas basin case is therefore based on a combination of sources—documentary materials on Indonesia and the Brantas basin, the background paper prepared for the visit, and the interviews conducted during the site visit. The findings and conclusions therefore do not represent the point of view of a single individual or organization, but emerge from a composite of data collected and reviewed by the research project team.

4. Brantas Basin Water Management Issues

4.1 Physical Characteristics of the Brantas Basin

The Brantas river basin is located within the province of East Java in Indonesia (see Figure 1). It has an area of approximately 11,800 km² and makes up 24.6% of East Java's land area. The basin is bounded by Mt. Bromo (2,393m) and Mt. Semeru (3,676m) on the east, a series of low ridges to the south, Mt. Wilis (2,169m) and its ridges on the west, and the Kedung low ridges and the Madura Strait on the north. The Brantas River is 320 km long, with its headwaters located in the Arjuno volcanic massif, a substantial topographic feature in the southeast portion of the basin. (Ramu 2004) The river flows around the massif clockwise, through the Malang Plateau, then west through the major dam and reservoir complex, made up of Sengguruh, Sutami/Lahor, Wlingi, and Lodoyo. At the southwestern portion of the basin, where the Ngrowo River joins it, the Brantas turns north towards the agricultural plains region, and then east through the delta regulated by the New Lengkong Barrage. This structure divides the Brantas into the Porong and Surabaya Rivers and the Porong and Mangetan Canals. The canals provide irrigation water for the paddy-growing region before discharging into the Madura Strait. The Porong River serves as flood diversion canal during the rainy season, and the Surabaya River is a primary source of raw water for Surabaya City. The channel slopes of the upper Brantas basin are relatively steep (greater than .005), becoming more gradual lower in the system (.001 or less). (IFPRI 2002)

There are two active volcanoes within the basin. Mt. Semeru erupts frequently with most of its debris depositing outside of the basin. The eruptions of Mt. Kelud, on an average cycle of 15 years, have had great effect upon river morphology and have led to considerable loss of human life and property damage. Its erupted material amounts to about 200 million m³. This volcanic ash has been a primary contributor to soil fertility for the basin, as well as to riverbed aggravation and reservoir sedimentation.

The tropical monsoon climate of the basin comprises the rainy season from November to April and the dry season from May to October. The annual mean temperature in the basin ranges from 24.2 to 26.6 degrees Celsius. Rainfall averages 2,000 mm, with over 80% occurring in the rainy season. Average rainfall in higher elevations is between 3,000 and 4,000 mm. Variation of rainfall from year to year is large: in wet years, rainfall averages 2,960 while in dry years (which occur once every three years on average) it averages 1,370 mm. The yearly relative humidity within the basin ranges from 75% to 82%.

The average surface water potential in the Brantas basin is estimated to be approximately 12 billion m³, with the average flow at an estimated 3 billion m³, or 25% of available surface water. The average annual flow is 823 m³/s in the upstream reaches, 3,859 m³/s in the midstream, and 5,300 m³/s in the downstream area. Groundwater exists mainly in the regencies of Madura, Surabaya, and Madiun. In the basin, 447 deep wells irrigate 25,730 ha. There are 38 deep wells for raw water, supplying large municipalities with a significant portion of their supply. Rural water supply is mainly from nearly 27,600 shallow wells. (Ramu 2004)

4.2 Population and Economic Development.

The Brantas basin is considered a strategic basin of Indonesia and East Java. Comprising 24.6% of East Java's land area, it has 23% of the province's forest land and 55.8% of its arable land (see Table 1). (Ramu 2004) Most arable land in the basin is used for productive farming (38%), while the remainder is used for forest, settlement, and non-agricultural activities. (Rusfandi 2000) The agricultural economy centers on paddy cultivation, nearly all of which is irrigated (Table 2). In 2000, the Brantas basin made up 32% of East Java's total rice production and 5% of that of Indonesia. Aside from rice, important food and cash crops include maize, cassava, soybean, peanuts, tobacco, coffee, and sugarcane.

Table 1: Land Use Data (hectare)

Location	Forest	Plantation	Agricultural Land	Homestead	Others	Total
East Java	1,346,500	859,600	1,157,100	564,960	864,038	4,792,198
Brantas Basin	309,400	31,400	645,800	170,100	23,300	1,180,000

Source: Land Use Plan, East Java.

Table 2: Production of Major Crops (1000 metric tons)

Location	1970	1980	1990	2000
<u>Rice</u>				
Indonesia	26.39	29.77	45.18	51.90
East Java	4.66	6.28	8.23	9.22
Brantas Basin	1.43	2.29	2.43	2.99
<u>Maize</u>				
Indonesia	2.60	4.01	6.73	9.68
East Java	1.05	1.69	2.58	3.49
Brantas Basin	0.03	0.40	0.49	1.12
<u>Cassava</u>				
Indonesia	10.69	13.53	15.83	16.09
East Java	3.33	4.03	3.71	3.62
Brantas Basin	0.09	1.03	0.86	0.95

Source: Statistical Year Book-2001, Central Bureau of Statistics.

The basin's population, which amounts to nearly fifteen million, has increased by 53.4% over the past 30 years and represents 42.4% of East Java's population (2000) with a density of 1,249 (Table 3). In 2001, the population of municipalities accounted for 25.3% of the total population in the Brantas River basin, while that for East Java Province was 10.7%. This is due to the presence of the two important industrial cities of Surabaya and Malang in the basin, which have grown to 2.5 million and 743,000 inhabitants, respectively. With these major cities, the GDP for the basin has increased 225 fold in Rupiah terms over the past 30 years and in 2000 contributed 56% to East Java's GDP. In that year, industrial production in the basin – a significant 77% of East Java's entire industrial production – was of the order of Rp 7.724 trillion (~ US\$ 858 million). The trend of GDP in East Java and the Brantas Basin is shown in Figure 2.

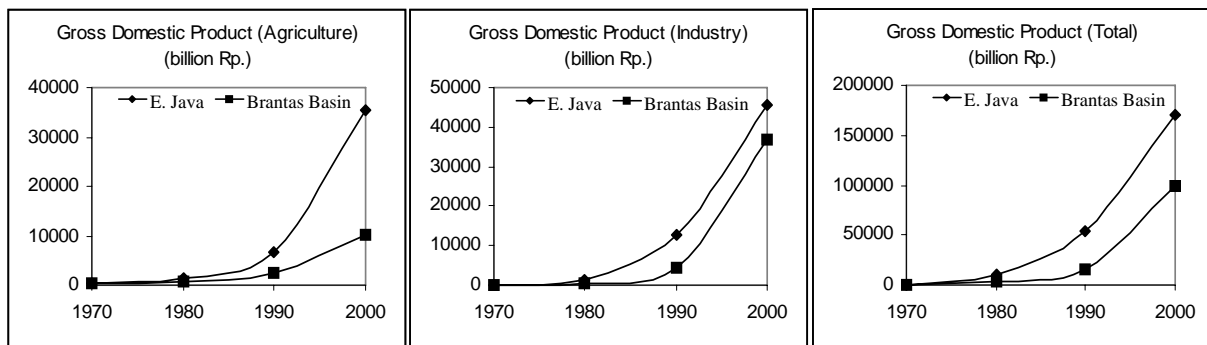
It should be noted that though industrial employment has grown from a mere 30,000 in 1970 to 959,300 in 2000, the bulk of basin residents still work in the agricultural sector with small- to medium-sized land holdings. Irrigators comprised 76% of surface water diversions in the Brantas in 2000, while industrial and domestic uses diverted 9% and 14%, respectively. (PJT I 2000 data).

Table 3: Population

Location	Area km ²	Population 2000	Density (Per km ²) 2000
Indonesia	1,920,000	207,600,000	108
Java	132,000	121,293,000	919
East Java	48,000	34,766,000	724
Brantas Basin	11,800	14,735,200	1,249
Surabaya City	300	2,445,000	8,150

Source: Central Bureau of Statistics, Indonesia

Figure 2: GDP Trend in East Java and Brantas Basin



Source: Ramu 2004

4.3 Water Resource Issues and Problems

From the above it becomes clear that the basin comprises a diversity of water users, ranging from millions of urban domestic users to industries and farmers, all depending on reliable access to sufficient amounts of safe water. The basin, with its dynamic socio-economic development is expected to continue contributing to East Java's and Indonesia's growth, thus its formal and legal designation as "nationally strategic" by the central government³. This important feature will be explored further below since it has had a major impact on the institutional and organizational options and that implemented with regard to the management of the basin.

At the same time as the Brantas basin's importance for East Java cannot be overstated, the intense industrialization, agricultural development, and population growth within the basin over the past three decades combined with its climate and physical features have contributed to several critical water resources problems, including pollution, floods, and seasonal water scarcity. While large investments have been made, including critical infrastructure as well as institutional investments for improved water resources management, problems to be resolved are still significant.

The most serious problem currently stems from untreated effluents from industry, domestic users, agriculture, and livestock breeding draining into the Brantas River. Pollution loads are primarily from domestic and industrial sources. Rapid urban growth and the lack of resources to address sanitation, sewage, and solid waste have resulted in increase of pollution in urban areas. On average, 65% of Brantas basin inhabitants are served by public, shared, or private sanitary facilities. Though this percentage is higher in urban areas – 70-80% - a corresponding 20-30% are not served. (Ramu 2004) Biological Oxygen Demand (BOD) in the Surabaya River along Surabaya city is about 10 to 20 mg/L. The BOD in the Brantas River along Malang city is 8 to 15 mg/L. (Rusfandi 2000) These amounts exceed the assimilative capacity of the rivers during the dry season. Industries are required by law to treat effluents, but regulatory institutions are very weak and lack resources to monitor and enforce regulations. The emphasis on economic development and support of export-related industries has been a disincentive in enforcing regulations on pollution control. Agricultural waste pollution is not as significant a factor given that agricultural activity mainly takes place during the rainy season when the flow of water is sufficient to flush out pollutants. However, agricultural pollution accumulating in reservoirs and rivers during the dry season from irrigation return flows is mobilized during the wet season in some reaches of the basin. In most reservoirs, nutrient

³ Under the former water law on Water Resources Development (No. 11 of 1974) and its Government Regulations (PP No. 22 of 1982)--based on deconcentrated public administration--and, the new Water Resources Law (No. 7 of 2004)--based on administrative and fiscal decentralization--GoI may assume control of basins defined in this manner (there are about 15 such basins). Thus, after 1999, even though the GoEJ is wholly responsible for the Brantas Basin's water resources, GoI may own and operate a management organization in its territory whose ownership, financing and tasks are centrally determined and management authority and responsibility as before (prior to January 2000). Under the Clarification section of Article 13(3) of Law No. 7, a "nationally strategic basin" is defined on the basis of basin characteristics such as: (i) size and volume of the water resources potential; (ii) quantity of sectors and population; (iii) social, environmental and economic impacts of national development; and (iv) negative impacts arising out of water's 'damaging power' (i.e. social & economic impact of floods and erosion or sedimentation)

depletion is causing eutrophication. Total pollution load in the basin has increased almost threefold in the last ten years.

The Brantas basin experiences flooding in its lower reaches due to flat slopes and encroachment of flood plains in rural and urban areas as well as sedimentation. Flood control infrastructure has been constructed to provide protection for return periods of 10 to 25 years. Nearly 60,000 ha. of land used to be flooded annually prior to flood control implementation.

Erosion/sedimentation from varying sources threatens the basin's water resources by raising its potential for flooding. A prominent source is the volcanic activity of Mt. Semeru and Mt. Kelud, which results in large quantities of volcanic ash. Hot lava causes immediate destruction, while soft molten rock embedded in mountain slopes readily disintegrates and flows down with rain, raising the riverbed of the mainstream and tributaries over time. Mt. Kelud erupts every 15 years on the average, resulting in high sediment yields in the middle reaches of the Brantas River, adversely affecting the Wlingi and Lodoyo reservoirs. Mt. Semeru's continuous deposits affect the Sengguru and Sutami reservoirs. The sediment depositions have decreased river discharge capacity for carrying high flows, requiring intervention measures to prevent yearly floods. In addition, a growing contributing source for erosion/sedimentation is wide-scale deforestation in the upper reaches of the basin to expand agricultural land use. This has subjected an estimated 18% of total Brantas lands in upper reaches to erosion, with detrimental impacts, inter alia, on reservoir infrastructure, water storage and power generation.

The rainy season provides an abundant water supply for the river basin but water availability during the dry season is often barely sufficient to meet existing demand when instream water quality objectives are taken into account. In the high-consumption region below New Lengkong Barrage, including the delta irrigation system, the Greater Surabaya municipal area and a high concentration of industries are particularly affected. Sugarcane factories' operations, which make up 33% of industrial water demand, take place in the dry season, leading to diversion of irrigation supplies to meet industrial demand during low-flow years, which contributes to crop losses.

5. Brantas Basin Management and Basin Stakeholders

5.1 Public Administration Structure of Indonesia and East Java

- a. Deconcentrated Government Prior to the year 2000
- b. Administrative and Fiscal Decentralization
- c. Sector Reforms and a New Water Resources Law

5.2 Management in the Brantas Basin

Due to its strategic importance, the Brantas basin has been subject to the central government's attention for decades. In 1961, the "Brantas Riverbasin Development Project" was created, which focused on infrastructure solutions to the water resource management challenges encountered in the basin. The Brantas Project continues to exist, is still managed by the central government and focuses on infrastructure development and rehabilitation and fully funded and implemented by the central government.

Given the devastating prominence of flooding in the basin, flood prevention was given first priority in the initial stage of the Brantas River Basin's development. The basic concept for the Brantas River Basin Flood Control Plan (Master Plan I) was "one river, one plan, one coordinated management." The basin's first master plan was prepared in 1961 using Japanese post-war reparation funds and consisted of large technical developments – dam structures, flood diversions, retarding basins, and riverbed channels. At that time, the Ministry of Public Works (MPW) established and oversaw the Brantas Project to carry out these efforts. Table 4 presents a brief timeline of Brantas basin management.

The table clearly illustrates the emphasis on infrastructure development during the first three decades of the Brantas Project's existence. Only in 1990, when it had become fully acknowledged that the sustainability of these investments was not achieved by the Brantas Project itself – due to lacking incentives for maintenance - a different approach was sought, leading to the establishment of the Perum Jasa Tirta I (PJT 1)⁴, a national state-owned company for river basin management, independent from the Brantas project. The early 1990s ushered in a new era of water resources management not only in the Brantas basin, but in Indonesia.

At the national level, Indonesia's second long-term 25-year development plan (PJPII: 1994-2019) emphasizes integrated development and management of water resources, with a greater focus upon the operation and maintenance of infrastructure. This new plan illustrates the shift in mindset of Indonesia's administrators from a single-purpose focus to a multi-sector river basin approach to promote integrated water resource management. It was decided that authority and responsibility for irrigation management, which had been the primary focus in the previous long-term plan, was to be transferred gradually to the district and provincial levels as part of Government policy to increase regional autonomy, while the allocation of water among irrigation and other uses would make up a core function of basin management (Ramu 1999). Indonesia began to set up national policies towards organizing institutions and integrating management functions on the basis of hydrological boundaries and not on administrative boundaries.

Integrated basin-level management was implemented early on in the Brantas basin. The Brantas Project had been responsible for planning for Master Plans I, II and III. However, in accordance with Ministry Regulation 56/1991, which delineates the preparation of river basin master plans as a PJT I task, PJT I was involved in generating Master Plan IV with the consultation of local government and users. Planning is now recognized by the central government to be part of PJT I's management function. Once the plan is accepted by the Central Government, PJT I can set up its long-term action plan to implement it. Master Plan IV emphasized conservation and basin water resource management – institutional approaches for proper water governance. PJT I also completed a long-term (1999-2020) plan with assistance from JICA, and are in the process of finalizing it for government approval.

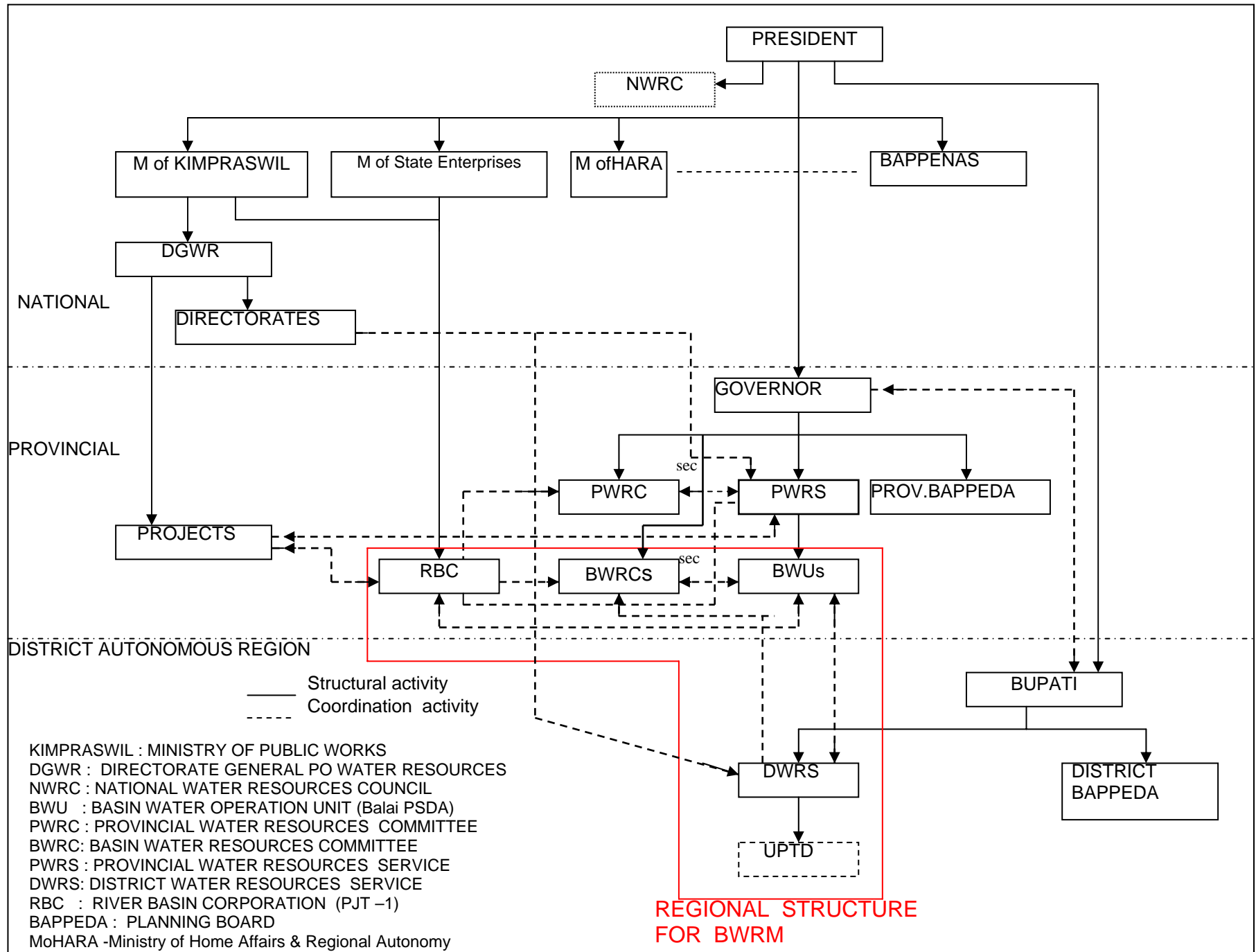
⁴ A 'Perum' is a corporation with both revenue generating activities that must be self supporting, as well as managing non-revenue generating public welfare tasks (such as flood control) that are wholly supported by government. Thus assets such as multi-purpose dams and flood control levees are not included in the corporate balance sheet, i.e. a return on these assets is not required. This is in contrast to a 'Peresero' such as PLN (the Electricity Corporation) that fully owns all its revenue-generating assets, all of which are included in its balance sheet and for which there needs to be a satisfactory financial rate of return.

There are a number of agencies that are involved fully or partially, directly or indirectly in water resource related functions in the basin. The 1998 study prepared by JICA lists 35 organizations that have a role in water resources development and management in the basin. It also lists the tasks and duties of these organizations. The institutional framework for Brantas Basin management is presented in Figure 3, indicating the national, provincial and district level institutions that have primary or significant roles and responsibilities in the planning, development, operation, management or regulatory aspects of basin WRM. The roles of the primary institutions are presented in Box 1.

Table 4: Master Plans & Organizational Developments in the Brantas River Basin

<u>Year</u>	<u>National Level Event</u>	<u>Brantas Basin Level Event</u>	<u>Description</u>
1945	Indonesia's Independence		
1961		Master Plan I	Emphasized flood control by constructing dams in the upper reaches and river improvement to increase capacity.
		Establishment of Brantas River Basin Development Project	Plans and constructs infrastructure for basin under authority of Ministry of Public Works.
1969-1998	General Suharto's New Order Government in power		Water resources and other governmental functions consolidated to center.
1969-1994	First twenty-five-year development plan, termed (PJPI)		Water resources policy emphasized rice production self sufficiency.
1973		Master Plan II	Emphasized irrigation development to support government policy on rice self-sufficiency.
1974	Water Law No. 11		
1985		Master Plan III	Emphasized water supply for domestic and industrial users to support the government policy on industrialization and urban development.
1990		Establishment of Perum Jasa Tirta I	Public company established in the Brantas basin for O&M of infrastructure and water operation in the Brantas river and its major tributaries
1994-2019	Second twenty-five year development plan (PJPII)		Emphasizes IWRM and O&M of infrastructure.
1998		Master Plan IV	Emphasizes institutional approaches to address conservation, management of basin water resources, and pollution problems.
1999 2004	Decentralization Law 22/1999 and Fiscal Equalization Law 25/99; New PP on structure of PJT I		Change in relationship of PJT I with respect to the Provincial and District Governments.
	New Water Law No.7 Revision to Decentralization Law of 1999 and Fiscal Equalization Law of 1999	New Master Plan??	Implications for future management? Provides both Province and Center with a greater say in matters of decentralization and fiscal resource allocation to the Districts

Figure 3: Institutional Framework for Brantas Basin Management



Box 1: Water Resources Management Institutions and Roles in the Brantas Basin

Macro and Program Planning & Budgeting	:	National, Provincial and District Planning Boards (Bappenas / Prov. Bappeda / Dist. Bappeda)
Management/Technical Supervision & Guidance	:	Ministry of Public Works its agencies (MPW , DGWR, Directorates)
Development	:	National or Provincial Projects (Proyek Brantas)
Regulatory	:	MPW , MoF, MoSE; Provincial Water Resources Service and Basin Water Resources Management Unit (Dinas PUP, Balai PSDAs); District WR or Public Works Service
Water Resources Management Implementation (including major infrastructure O&M for 40 rivers)	:	Brantas River Basin Corporation (PJT-I) established through Government Regulation No.5 of 1990 later replaced by Government Regulation No.93 of 1999.
Irrigation Management	:	<ul style="list-style-type: none"> a) District Water Resource Agency (Kab. Dinas PU) for Irrigation Systems within a district b) Provincial Basin Water Resource Agency (Balai PSDA) for irrigation systems that are inter-district. c) Provincial and District Irrigation Commission
Coordination	:	<ul style="list-style-type: none"> a) Ministerial Coordination Team (Tim Kordinasi) at the national level which is expected to be replaced by a National Water Council with stakeholder representation in 2005. b) Provincial Water Resources Committee (PTPA) at the provincial level, which is expected to be replaced by a Provincial Water Council with stakeholder representation in 2005. c) District Water Resources Council (KTPA) to be setup in 2005 with stakeholder representation. d) Basin Water Resources Committee (PPTPA) at the SWS level which is expected to be reorganized with stakeholder representation in 2005.

Source: Ramu 2003

5.3 The Brantas Basin Management Corporation (Perum Jasa Tirta I)

The Brantas Basin Management Corporation (PJT I) was established by governmental regulation in 1990 as a state corporation to operate and maintain major water resources infrastructure in the basin and to manage its water resources. Due to the basin's relatively high level of economic development, it can achieve a reasonably high level of O&M cost recovery from water users: hence the logic of corporatizing the WRM function with respect to bulk water supply and allocation.

This approach to outsource the water resources and infrastructure management functions to a freestanding company is rather unique, not only in Indonesia (where one other such public corporation – PJT II has been established to manage the water resources of the Citarum Basin in West Java), but worldwide.⁵ PJT I manages water supply allocation, water quality, flood control, river environmental management, and water resource infrastructure for 40 rivers, constituting the majority of significant water resources in the basin. The remaining secondary, tertiary, quaternary rivers are maintained by the province through Balai PSDA if they cross districts (kabupaten) and by the District (Kabupaten) dinas if they are within the district boundary. Brantas PJT I serves as a bulk water supplier and allocator to the irrigation systems served by the basin rivers under its mandate; the rest are served by the Balai PSDA or the district dinas. It is responsible for operating, maintaining, and managing the dams, hydraulic works and, flood control infrastructure and the flood warning system for rivers under its mandate. It also takes care of dam safety assurance for reservoirs under its management. The Brantas Corporation also participates in the management of catchments albeit in a small way and in promoting water based tourism.

Financial Structure and Funding of PJT I

As a state-owned company PJT I is supposed to turn in a set profit to the Central Government and accordingly seeks to fund itself through water supply fees from industry and for supply to the hydropower units within its dams, as well as municipal water suppliers. As in many other countries, farmers are exempt from payment for irrigation water deliveries although they constitute the largest water user group and consume most of the Brantas Basin's developed water supplies.

PJT I must pay a dividend to the Ministry of Finance, and according to information provided during the field visits, this profit should increase each year by Rp. 7 billion (~ US\$778,000). PJT I prepares a program and budget regarding their profit for the Ministry of Finance and the Ministry of State Enterprises. Upon closer review, the company is currently able to cover around 30% of actually needed O&M of infrastructure under PJT I management from its resources, after the pre-established "profit" has been paid to the central government. According to information received from officials, this needs-based O&M expenditure used to be higher – around 60% - but with Indonesia's economic crisis in the past years, revenue collection has been more difficult. In this context it is important to point out that PJT I is subsidized by the central government because the salaries of its staff – many of whom were originally hired from the Brantas Project – continue to be paid from national rather than PJT I funds. Thus, the budgetary arrangements between PJT I and central Government are not simple, but at the same time it is clear that the quoted figure of 30% available for O&M needs to be seen in the light of the need for additional funding subsidies for PJT I's public goods activities which are outside its commercial operational mandate. This relationship also indicates the continued dependence of management in the Brantas basin on national funds.

⁵ The Water Resources Management Company (COGERH) of Ceará State in Brazil has been established in a similar manner and with similar objectives and is also included in this case study series. Globally, however, this approach is often recommended in order to increase the focus on and incentives for the management function of water resources, but it has so far seldom been implemented.

PJT I Management Structure

For the technical aspects of river basin management, PJT I solicits guidance of the Ministry of Public Works (MPW), which supervises PJT I's management and functions. The provincial Water Resources Services Office (Dinas PUP) serves as a regulator for PJT I. District-level government provides support for operational matters, providing enabling conditions at the local level for PJT I. The Ministry of Finance sets tariffs for hydropower users. The Governor, who serves as the President's representative in the region, sets tariffs for municipal and industrial users, and the Minister ultimately proposes the rate by regulation, further signifying the Central Government's continued influence on fiscal aspects of basin management. Thus PJT I has no control over the tariff of its bulk water supply services and its revenue is controlled by water rates fixed by political-economic and not cost-plus considerations. Further, irrigation bulk water supply derives no revenue. This explains, inter alia, why PJT I cannot meet its full O&M costs.

Management of Brantas PJT I is through a Supervisory Board with a President Director assisted by three directors. Its structure indicates ministerial authority over its affairs, which is typical of Indonesian state corporations. The President Director and Director are appointed by the President on the recommendation of MPW. The Supervisory Board, which is answerable to the Minister of Finance and MPW, carries out the general supervision of the corporation, including implementation of its work plan and annual budget. Every three years, two to five members are chosen to sit on the board from MPW, Ministry of Finance and agencies whose activities are related to the corporation. The Supervisory Board is appointed by the President on a proposal from MPW, cleared by MOF. The Governor of East Java also sits on the Board. The power of the Supervisory Board as stipulated in the regulation ensures a degree of management autonomy to the basin agency. Nonetheless, it is apparent that given the Supervisory Board's structure and the fact that PJT I's infrastructure O&M costs are subsidized by MPW, MPW wields considerable influence over its operation and, it can earn income from Directors' fees, etc.

In summary, both from the financial and overall decision making perspective there is a clear and continued relationship and dependence by the corporation on the national, and to a lesser extent, on the provincial government.

5.4 Major Stakeholders in the Brantas River Basin

Box 2 describes the stakeholders of the Brantas river basin.

Box 2: Major Stakeholders of the Brantas River Basin

Principal Water Users

1.1.1.1.1 Irrigation

Irrigated agriculture, the largest water consumer in the Brantas river basin, consumes about 20% of annual discharge of the river and over 70-80% of utilized water abstractions therefrom. Of the 907,000 ha of irrigated land in East Java, 42.6% is within the Brantas basin. The amount of water diverted for irrigation varies from 2,298 mcm to 2,448 mcm per year. There has been a dramatic transformation from low-intensity agriculture to high-intensity agriculture within the basin. Cropping intensity increased from around 0.8 in 1960 to 2.2 by 2000, while the area cultivated increased from 247,000ha to the current 387,100 due to improvements in rice variety, increased agricultural inputs, and reliable water supply in the dry season (through regulation of the reservoirs built in the basin by the national government).

Water user associations (WUAs) manage water distribution and the O&M aspects within tertiary blocks (50-150 ha in size). For many larger irrigation schemes, WUAs have been organized into WUA Federations (WUAFs). Since 2000, responsibility for O&M of entire irrigation systems has devolved from the province to the regency-level irrigation agencies. If there are schemes that cross regency boundaries, WUA representatives attend the Balai PSDA meeting. Changes are underway to include representatives of WUA federations in basin level decision-making (PPTPA).

1.1.1.1.2 Domestic Water Supply

Water is provided for domestic purposes by fourteen regional water supply state-owned enterprises (PDAM), which supply treated drinking water to urban areas. PDAMs are managed as public corporations under the authority of the district Government. East Java Water Resources Services Agency (Dinas PUP) is responsible for issuing a license for raw water abstraction, while PJT I is responsible for delivery according to the licensed water allocation. In 1960, the domestic raw water supply was around 73 mcm. In 2002, the total volume taken from the Brantas basin for domestic purposes was around 243 mcm. PDAMs are represented directly on the Basin Water Resources Committee and have a close working relationship with PJT I.

1.1.1.1.3 Industry

Industrial development in the basin has increased considerably due to reliable water supplies for industrial use and port access in Surabaya. Industrial production has increased from Rp. 41.9 billion (US\$4.7 million) in 1970 to 7,723 billion (US\$858 million) in 2000, accounting for 77% of East Java's industrial production. Industrial water demand in 1970 was around 50 mcm and in 2000 it was 129 mcm. In 2002, around 141 mcm of industrial water was supplied from the Brantas to over 120 registered industries. Industrial water supply is regulated by licenses issued by the Provincial Dinas PUP on the recommendation of the PJT I, who are responsible for implementing water delivery. The Ministry of Industry represents industry interests in the PTPA.

1.1.1.1.4 Hydroelectric power producers

Hydropower capacity within the basin has increased from 31 mw (170 million kwh/year) in 1970 to around 240.2 mw (1200 million kwh/year) in 2000. Hydropower plants are owned and operated by the National Power Corporation (PLN), while the PJT I operates the dams and provides the water for hydropower production. Given the coordination requirements between the infrastructure of PLNs and PJT I supplies, both have a close working relationship. PLN, a state-owned profit-generating corporation (i.e. a Peresero), participates directly in the PTPA.

1.1.1.1.5 Brackish water fish ponds

Brackish water fishponds for fish and shrimp cultivation are located mainly in the coastal areas of the Delta. Freshwater for fishponds is taken from drainage canals in the irrigation area. The existing total area of brackish water fisheries in East Java was approximately 60,000 ha in 1997, out of which 54,000 ha was under the extensive method of cultivation and only 6,000 ha was under intensive cultivation (introduced in 1985). Brackish water fishery area in the Brantas Delta is approximately 15,730 ha, based on the extensive method of cultivation. Water demand is estimated to be about 1.29m³/s, which is supplied from irrigation drainage water.

Water Resources Regulators

The Ministry of Public Works (MPW), manages the fifteen strategic and/or trans-provincial river basins and provides Governor provides the licenses under MPW oversight in these basins. Though local governments have responsibility for management and regulation of irrigation networks and structures within provincial jurisdiction, MPW is charged with planning for irrigation water supply to meet regional needs on the basis of the Governor's proposal. MPW is required to coordinate affected parties to address social impacts that arise from reservoir construction. MPW also decides the method for flood risk assessment, flood disaster management, management of flood areas, and guidance on the precautions for flood prevention either before, during, or after the flood. The Governor of East Java then is responsible for coordinating the flood prevention effort by involving all agencies involved.

East Java Water Resources Services Agency (Dinas PUP) has primary responsibility on water resources development and management at the provincial level. The Agency provides the Provincial Governor with technical assistance in water resources management policy, infrastructure development, operation and management of irrigation facilities, issues abstraction permits and related activities, with focus on activities that transcend Kabupaten/Kotamadya (district) boundaries.

Other Ministries of the Central Government have a key regulatory role in the Brantas basin:

- The Ministry of Finance provides fiscal oversight of basin management for strategic basins.
- The Ministry of Mining and Energy is responsible for the administration of groundwater resources.
- The Ministry of Forestry has regulatory responsibility for issues concerning deforestation; and
- The State Ministry of Environment has a regulatory responsibility in matters of pollution control and water quality management.

Nevertheless, these responsibilities are devolved to the provincial government and its various sector dinas.

Water Resources Operators

1.1.1.1.6 PJT I

PJT I's activities are financed through fees from industry and hydropower sectors and municipal water suppliers. PJT I's mandate is to manage water quantity, water quality, conservation, and maintenance of water resources infrastructure. PJT I provides bulk water supply for irrigation systems, raw water for municipal and industrial use, water supply for hydropower plants, manages sand mining services, develops and operates tourism facilities on land and reservoirs under its control in its working area, and carries out consulting services.

Regional Offices of Water Resources Management (Balai PSDA)

Balai PSDA were established in all of the river basin territory (SWS) within the East Java PWRS in 1998 as part of GoI efforts to decentralize water resources management to operate, maintain and manage the infrastructure and the water resources in the rivers that are not under the jurisdiction of PJT I. These rivers include the 2nd, 3rd and 4th order rivers in the Brantas basin without major infrastructure or major water benefits with the exception of irrigation. There are 3 (three) Balai PSDAs in the Brantas river basin. Decentralization policies maintain that irrigation systems within district jurisdictions are managed by districts, so Balai PSDA manage the inter-district irrigation system and serve as the field regulatory arm of the Dinas PUP. All major infrastructure in the Brantas basin is managed by the PJT I, so the Balai PSDA manage the smaller size irrigation infrastructure. These agencies are the lowest level provincial agency for advice and implementation of regulatory decisions (abstraction licensing, effluent discharge licensing, flood plain use, etc.).

Irrigation Water User Associations (WUA)

Irrigation water users were empowered to make decisions concerning operations at the irrigation system level through Government Regulation (PP) No. 77/2001 on Irrigation. In accordance with this regulation, district level administrators (Regents or Mayors) are required to establish District Irrigation Commissions to oversee allocation and distribution of irrigation water for agricultural and other users at the district level. It is the Provincial and District Government's responsibility to develop WUAs. Since 2001, East Java has implemented the Irrigation Management and Transfer program (IMT) on a pilot basis. Through IMT, management and associated decision-making is transferred to Federations of WUA (WUAF). The WUAF have in some cases taken on small maintenance works. The objective of the IMT program is for decentralization of irrigation management in order to involve farmer organizations as partners with district level water agencies regarding investment, O&M, and management decisions. This also helps increase farmers' contributions towards O&M costs of irrigation systems. However, the new Water Resources Law is interpreted as not allowing delegation of irrigation management responsibility to WUAFs outside tertiary blocks and PP 77/01 is under revision. (Note: As a consequence of issue of the new Water Law #7/2004 the IMT program will be replaced by a Participatory Approach Program or PPP through revision of PP #77/2001).

Source: Ramu 2004

6. Findings Concerning Performance of Basin Management in the Brantas Case

The performance of the PJT I in achieving its objectives is best evaluated by considering the overall policy objectives involved in its development and implementation, as well as the most critical issues of the basin. Based on the Ministry of Public Works Regulation No. 56/PRT/1991, Article 6, the main tasks of the PJT I include:

- Performing operation and maintenance of water resources infrastructure;
- Water supply services;
- Management of the river basin, including water resources conservation, development, and utilization; and
- Rehabilitation of water resources infrastructure.

Brantas PJT I's activities have evolved with the subsequent decrees. Its management tasks are:

- Preparation of water allocation and drought allocation plans for Provincial Irrigation Committee (PIC) [or Provincial Irrigation Commission in future] approval and bulk water allocation based on the agreed plan and user licenses;
- Planning and operating the flood control and the flood warning systems;
- Provision of technical recommendation for water licensing; and
- Undertaking water quality monitoring, provision of technical recommendations for wastewater discharge and participation in the Clean River Program (Prokasih).

The tasks of PJT I concerning operation and maintenance include development and implementation of programs concerning:

- General maintenance and some less expensive rehabilitation of infrastructure;
- Sediment removal and monitoring in critical areas;
- Providing technical recommendations;
- Monitoring sediment mining in rivers; and
- Preparing land use plans, providing technical recommendation for licensing of river corridor utilization, and monitoring river corridors.

These activities are indicative of the shift that has taken place in Indonesia since the mid-1990s from emphasizing flood control to strengthening institutional aspects (hydrology, flood fighting, flood warning, flood management, etc.). The Ministry of Public Works has recognized the importance of O&M, river channel improvement, and a strong basin-wide organization to manage floods and allocate water resources on a near real time basis. PJT I has achieved results in implementing a reasonably good system of water allocation and management and a reliable flood forecasting system, as well as maintaining major infrastructure in fairly good condition. Managing water quality, catchment conditions, and the river environment, however, are the responsibility of many entities, and there is need for greater coordination and authority to address these issues.

6.1 Flood Management

The regional government (Province/District) is ultimately responsible for flood management and addressing flood damage, but PJT I plays a primary role, having responsibility for O&M of flood protection infrastructure and for the Flood Forecasting and Warning System (FFWS). It coordinates activities of all relevant agencies and the governor, providing information concerning water levels. The FFWS at PJT I's main office is used to prevent or mitigate damage and to ensure public safety. Field data are transferred to the master station every 30 minutes. Flood defense teams perform flood-fighting activities. Information concerning river conditions and damage at every stage of a flood is disseminated to people living near the river. Agreements exist between the province and the districts regarding how to manage floodwaters. According to interviewees, damage due to floods has decreased significantly in the Brantas basin since their establishment. Thus, while floods remain to be a challenge in the basin, not least due to new threats such as indiscriminate forest logging in the upper watersheds (dealt with under a different ministry), flood management has improved and can be seen as one of the achievements of the past decade's emphasis on institutional change in the basin.

6.2 Water Quality

For water pollution control, final responsibility lies with the governor in accordance with Government Regulation (PP) 20/1990 on Water Pollution Control. Provincial Regulation 5/2000, in the interest of the decentralizing authority, makes it possible for the Governor to delegate responsibility to the head of the Provincial Environmental Pollution Control Office (Bapedalda). This agency coordinates all other agencies dealing with water pollution control. The Provincial Public Works Service is responsible for domestic and municipal wastewater and installation of sanitation facilities and Provincial Industry Service is considered responsible for industrial pollution control. Meanwhile, Law 22/1999 further devolves authority to District governments and urban municipalities to deal with their industrial polluters and to handle sewerage and wastewater treatment. At the basin level, as part of the water sector reform, Government Regulation (PP) No. 82/2001 superseded PP 20/1990 and places management of urban and municipal water pollution under provincial, district and municipal purview. This PP also allows the levy of effluent discharge fees. The Ministry of Agriculture is to be involved in non-point source pollution from agricultural sources but formally, its regulation is under KLH.

Regardless of all these new developments, it is ultimately expected that the governor or regent, according to their authority, will take action for a polluter to be prosecuted. The problem of accountability for steps up to that point is very unclear. Provincial authorities hold municipal government responsible for not having commitment or capacity to address the issue of urban and industrial pollution, while municipalities and other stakeholders consider the governor too inaccessible to call upon to address it. There is also a problem of weak penalties for those industries that are prosecuted, which does not make polluting prohibitive.

When asked how they might envision the possibility of tackling industrial pollution, PJT I staff would like to see the polluter-pays-principle as an instrument to encourage industries to limit their level of pollution to that agreed to in their license. Monitoring, charging a fee for pollution, and having a strong pollution law would all help

to improve treatment facilities and to give industries incentive for treatment. There is a legal basis for water pollution fees in Government Regulation No. 6/1981 (and also PP 82/01), which stipulates that a contribution to fund water resources infrastructure O&M can be collected as a payment from those industries whose activities have polluted water bodies within PJT I's jurisdiction. The national government is currently trying to set up further enabling legislation for regional and local government wastewater disposal licensing and fee collection for all river basins. Hopefully this will be piloted in the Brantas basin with PJT I playing a major operational role through an operational concession from the Provincial Environmental and Pollution Control Office. In this context it is important to note that the water supply companies, which would usually have a major incentive to improve wastewater treatment, are only responsible for water supply. Thus, their incentives, like those of every other stakeholder, lie in hoping for the province to undertake needed investments and to enforce regulations.

Sedimentation and Catchment Management

To contend with sedimentation problems that originate largely from the basin's active volcanoes, PJT I regularly dredges the middle part of the basin. In the lower part of the basin, they operate a gate to control the water level and flushing. In the upstream area, they participate in national reforestation programs. However, rapid deforestation due to timber harvesting and uncontrolled agricultural development as well as forest encroachment in the upper reaches continues to cause serious erosion, which has become more intensified with expansion in the upper reaches since the economic crisis. Much of it has not employed terracing and appropriate agricultural erosion control practices, exacerbating sedimentation problems in the rivers during the rainy season. The Ministry of Forestry is ultimately responsible for handling deforestation issues in forest areas under its control while the Ministry of Agriculture has a soil conservation/extension role outside these areas. However the Ministry of Forestry's jurisdictional reach is considered by interviewees to be limited since decentralization of responsibility to the Districts. Government regulation grants different levels of government the right to issue different forestry concessions: the central government issues large concessions, the province issues intermediate-sized concessions, and local government issues small concessions. As such, there is little incentive for local government to manage forest resources well. (World Bank 2003) Conservation efforts upstream have not been successful since they involve small plots under local government jurisdiction that have no catchment-wide impact.

O&M of Infrastructure

Generally, it is difficult to assess the effectiveness of "soft" non-structural water resources management functions, while planning, financing, and construction of technical projects have direct and visible outcomes. In a context where many development priorities are faced at once under conditions of financial constraint, housing the construction of large infrastructure projects and O&M responsibilities within the same agency tends to lead to expenditure bias against O&M. The PJT I was developed to address this issue of bureaucratic supply failure regarding O&M of infrastructure. PJT I has been responsible for operating, maintaining, and managing designated water resources infrastructure on behalf of the Government, which owns the infrastructure. In the circumscribed role of planning operations, undertaking day-to-day operation, maintaining records, carrying out minor maintenance, addressing conflicts and taking

responsibility for all operational management, PJT I is successful. They also plan and implement rehabilitation activities that are necessary for operational purposes and that are within their financial limits to conduct. PJT I has autonomy in day-to-day operational affairs, but is dependent upon a financing subsidy that is not completely within their control as it is set through a political process. Since it does not collect sufficient funds to cover O&M costs, it relies upon the Central Government to cover flood control costs, irrigation bulk water supply costs and major structure rehabilitation as a social welfare activity. Additionally, though PJT I rehabilitates infrastructure where it can afford to, it relies heavily upon the Central Government to carry out larger rehabilitation efforts through the Brantas Project to rehabilitate gradually deteriorating infrastructure.

It is worth noting, however, that despite PJT I's financial shortcomings to cover costs, the structure of user charges as reflecting multiple use interests provides a strong base for eventual full cost recovery. Different sectors pay different amounts established through a political process in which the PTPA (a provincial water resource coordinating body) has an important role. Industrial, hydropower, and municipal supply users seem to understand that their fees reflect a willingness to pay for PJT I services to lower production costs, and they have an appreciation for maintaining PJT I services.

6.3 The “Brantas Spirit”

PJT I has proactively developed strong informal working relationships with many of its stakeholders in order to effectively coordinate activities among Central-level ministries, Provincial-level agencies, District-level governments, local water users and concerned public and NGO organizations to carry out its duties. As a champion for river basin management, it has embodied the notion of the “Brantas Spirit,” taking the initiative to conduct public outreach and public relations activities to educate different sectors about the value of integrated water resources management. PJT I staff and management display clear pride in working for the company and in doing a good job.

Within the Brantas basin, PJT I works with a number of local NGOs and institutions towards public awareness objectives. For instance, the NGO Raditya Lestani, operating out of the University of Education in Malang, trains teachers for 68 high schools located within 30 km of the Brantas river in an environmental education curriculum for their students based in chemistry, biology, geography, and economics. Students prepare a water quality inventory and learn about the river's ecology. PJT I supplies biological testing equipment and also works with the University of Brawijaya in Malang on environmental awareness issues for the students. Every two years they host a river trip. The coordinators of these programs believe that education about water resource issues changes behavior not only of the students but also the students family.

In light of the limitations in financial and policy making autonomy and overall authority, PJT I is considered to be successful by stakeholders because it is committed to upholding a professional and neutral profile, which gives it significant legitimacy among water users who seek unbiased information, expertise, and mediation assistance. PJT I focuses upon being a reliable and accessible service provider for tasks it has most authority over to invoke legitimacy: water allocation and supply and flood control. The insulation from policy making activities works in its favor because it places PJT I squarely in the business of operating and maintaining the basin infrastructure. Water

users evaluate it as such, understanding that PJT I is not to blame for issues that they have limited authority and resources to address.

6.4 Coordination and Stakeholder Involvement

PJT I undertakes significant day-to-day coordination in order to carry out its operations, however this has its limitations. The lack of general coordination among regulators, providers, and users at basin, provincial, and central government levels challenges the larger achievement of IWRM objectives. Much of this is exacerbated by the lack of proper representation by non-governmental stakeholders in decision-making fora, such as the provincial and basin water management committees by water users (e.g. farmers), private and public sector industry representatives and also NGOs. This is certainly a heritage born out of the decades of authoritarian government structures. As it currently stands, national, provincial, and basin-level coordinating committees are largely consisting of governmental agencies serving on behalf of stakeholders. Moreover, the lack of a uniform national-level water resources policy has not been in place to assist the navigation among discrepancies in legislation. As such, overlapping functions and conflicting objectives among agencies remain an unresolved issue.

With increasing democratization of Indonesian society, which is clearly also affecting water resources management structures across the archipelago, changes are underway following the enactment of Law No. 7 in 2004 to reformulate the make-up of coordinating committees at all levels (national, provincial, basin and district) to formally extend participation to stakeholders and interest groups directly. The National Water Council, an apex body at the national level, will replace the *Tim Kordinasi*, which is a Ministerial team that is currently responsible for coordinating water resource policy making at the national level. The Apex body will manage a coordination framework for national water resources, with responsibility for guidance in policy formulation, resource allocation, program implementation, regulatory control, inter-sectoral coordination, and issue resolution. It will comprise various ministers and stakeholder representatives, playing an important part in presenting an integrated approach and commitment to water resources management at the national level.

6.5 Water Management Instruments

Compared to many other (developing) countries and to other basins in Indonesia, the Brantas basin has a number of management instruments in place and these can explain part of the PJT I's performance in this past decade. They include use of water licenses, water use fees for at least two water user groups (industries and municipalities), licensing for sand excavation in river channels, communication with a number of stakeholders, including public accessibility of data as well as educational activities, a transparently applied water allocation mechanism, based on a well-maintained water monitoring network. These instruments and the application in the Brantas basin are highlighted in this section.

Water Use Rights, Allocation and Conflict Resolution.

Indonesia's water rights system involves water use rights. In Indonesia's Constitution of 1945, water resources are ultimately governed by the state, to be utilized for the welfare of the people. Water Resources Law No. 11/1974 identifies water as a gift of the

Almighty that everyone has a right to use, though certain uses require permission. In 1982, Government Regulation No. 22 stated that permission is not necessary for basic daily needs, domestic purposes and for livestock. According to both Water Resources Management Law No. 11/1974 and East Java Governor's Decree No. 316/1988, water allocation priorities exist among domestic use, agriculture, industry and hydropower generation in that order. Allocations among specific users, however, are not clearly defined, nor is prioritization with respect to long-term and emergency water shortages, which means that this is open for interpretation. There is also no reference made to river maintenance flow and its relevance to water quality preservation. As such, river water quality is managed at PJT I's discretion and low flow augmentation to maintain water quality falls behind water deliveries to licensed users and irrigation. The new Water Law No. 7/2004 further excludes public irrigation systems (farm holdings below 2 ha) from obtaining water use rights through a permit and classifies it as a basic need. For non-basic needs, the priority of water allocation is left to the regional governments according to basin needs. However, the law does mandate the establishment of a framework for water use rights with domestic needs and existing public irrigation being of the highest priority. The water use rights of public irrigation systems may not be traded or transferred lest small farmers become disenfranchised of their rights by commercial interests (water bottling industries, golf courses, etc) who can afford to buy farmer water use rights.

Water licensing was formally established in the Brantas basin in 1991, and involves a process that takes three months to complete. A water user requests a license from the Governor. By Government regulation, PJT I completes a technical assessment, reconciling the requested quantity and location of the demands with predicted water supply and availability. Both the district (Kotamadya/Kabupaten) and PJT I provide a technical recommendation to the Governor, who then awards the license to the user. The new water law stipulates that requests will go directly to the PPTPA (the basin water resources coordinating committee) before going to the Governor, so as to shorten the process and permit stakeholder involvement. This suggests a further empowerment through participation ('voice and choice') to basin-level institutions. Also, according to the new water law, licenses will be instituted for main intakes of irrigation systems that serve non-subsistence farmers and other commercial uses in the irrigation system.

As a collective or usufruct property right, a water use right is very flexible, which is useful under unpredictable or changing conditions. Flexibility is often emphasized as the reason why water use rights should be maintained. Such flexibility is difficult to capture in formal or statutory law, however, modern concepts advancing water use rights are slowly being accepted within Indonesian society, but many politicians fear the transferability of rights and the prospect of losing control of water resources to local and foreign interests through privatization.

The Provincial Water Resources Committee (PTPA) serves as a coordinative body to provide operational policy direction for the Brantas basin water resource development and management. It meets twice a year – before the rainy season and before the dry season – to decide upon water allocation among various users and the rule curve for reservoir operation. Made up of 80% governmental representatives and 20% non-governmental representatives, participants are to discuss allocation, pollution control, flood management, and information concerning water demand against the water balance.

Demand information is collected by the Deputy Governor and provided to the Technical Committee of the PTPA, comprising PJT I, three Balai PSDA managing SWS with smaller rivers within the basin, and the Provincial Water Resources Services. Before a PTPA meeting, the Technical Committee analyzes this information to calculate the water balance against climate information and expected demand. This, in turn, is presented to the PTPA, and if accepted, is signed by the Vice Governor. If there is need for a significant modification in the allocation pattern, this is discussed in the PTPA for revision.

Conflict of interest among stakeholders exists, particularly during the dry season, when there is not enough water available to cover all sector water demands. Irrigation water users, the largest water consumers (almost 80% of water during the dry season), receive only 60-80% of their water demand. During the dry season, PJT I reduces allocation for irrigators once a week, without reduction for licensed users. Under drought conditions, irrigation allocation is reduced to 55%, while other sectors stay at 100%. When there is a shortage in water supply, the PTPA participants decide to reduce the irrigation sector's water allocation before reducing others. The Provincial Irrigation Committee (Provincial Irrigation Commission in future) and the Balai PSDA members collect information concerning main-intake demand and communicate impending reductions to farmers, but do not seem to represent farmers' concerns in PTPA or PPTPA. Water shortage is a common problem in most areas of the basin to irrigation farmers, and many farmers complain that water is not available when needed or is insufficient when available during the dry season. (JICA 1998). Institutional developments are underway to organize farmer interests through federations of water users associations (GP3As) and to have farmers participate more directly in decision-making at the river basin level through a newly formulated PPTPA structure and the various District Irrigation Commissions which include GP3A or Stream Level Committee/Induk representation.

With respect to conflict resolution, the Provincial Water Resources Service Office (Dinas PUP) normally handles conflicts among users in the irrigation system (upstream-downstream conflicts, conflicts between uses) through a negotiation process. Instances of informal water use rights exchange between users and types of uses have taken place. Intersectoral conflicts concerning water allocation among other stakeholders are handled by PJT I within the PTPA. PJT I has a close relationship with its licensed stakeholders, who consider PJT I staff to be a professional and objective third party on an equal plane with them. PJT I is also called upon by licensed stakeholders to communicate stakeholders' concerns to the East Java Governor and to mediate their conflicts with NGOs or polluters.

6.6 Water Fees and Financing Brantas Basin Management.

Financially, PJT I strives to be self-supporting, receiving its revenue primarily from municipal and industrial water supply and water supply for hydro-power generation and, to a lesser extent from consulting, sand mining, tourism and leasing of land. Tariff-setting, however, is not in its hands and is decided through a political process. The Ministry of Finance sets tariffs for hydropower users. The Provincial government sets tariffs for municipal and industrial users, but the Minister ultimately proposes the rate by regulation.

As a state-owned company, PJT I is required to show budget surplus for it to be considered a healthy corporation (at the cost of adequate maintenance). PJT I also promotes non-water service activities (consulting, tourism, river sand mining services) to raise funds. The annual budget has to be approved by the Ministry of Finance, ensuring Central Government oversight over its finances.

PJT I does not collect enough money to cover O&M. The highest amount of O&M costs the PJT I has been able to cover was 60% in 1996. After the economic crisis in 1997, the corporation could only cover 31% of the normal budget because of inflation and because many beneficiaries did not want to pay the tariff. The central government assists with maintenance and rehabilitation of the river basin and irrigation infrastructure through a direct budget where the operator cannot afford to cover O&M, for instance, through a block grant to the Provincial Government. The Central Government provides PJT I with about Rp. 50 million (~ US\$5,556) for flood control, but this is not sufficient to cover costs. PJT I's flood control budget is used as a source of revenue when there is no flood. The Central government also provides funds for infrastructure rehabilitation through central projects, which is considered a public service offering. The policy of Public Service Obligation was started recently, and refers to partial funding by government ministries for public services in accordance with budgetary monies available. As more clearly specified in the new water law, the Ministry of Finance is obligated to provide funds to river basin management agencies for public service and welfare issues. The cost of social benefit should be borne by government, not by beneficiaries.

PJT I operates a resort area along the Selorejo reservoir with the interest of promoting recreation, tourism, and water sports within the basin and rents out its land for agricultural purposes. For developing such non-water sources of income, which comprised 25% of revenues in 2003, PJT I seems to have some level of autonomy as long as they fulfill their larger organizational objectives and make PJT I a profitable corporation.

With respect to resource endowments, industry, hydropower, municipal water suppliers earn far higher revenues than the agricultural sector and pay service fees in exchange for a regular water supply for their operations. It seems to be generally understood among licensed stakeholders that they are taking on disproportionately large costs and subsidizing basin management costs because irrigation farmers might not be able to afford to pay water service fees, or that obtaining fees from them is difficult given monitoring and coordination costs. Farmers make up most of the Brantas basin's population. According to a survey study prepared by JICA in 1996, land farmed in the Brantas basin tends to be in small parcels of less than 0.50 ha/family, and farmers supplement their on-farm income with off-farm income. Irrigation farmers pay a contribution in the form of paddy as a WUA membership fee, leaving them with few resources to contribute to basin-level O&M service fees.

The revenue regulations issued after the enactment of Law No 25 on Fiscal Equalization in 1999 call for service fees (e.g. water service tariffs) collected by a national public corporation within the jurisdiction of a provincial and local government to be shared with the said governments ('retribusi'). This may or may not affect the revenue collected by PJT I and the net balance available for transfer to the Ministry of Finance.

Furthermore, the new Water Resources Law provides for a collection of a basin Water Resources Management Fee [article 77(3)] to pay for the planning, O&M and management administration costs of basin water resources management. However, Article 80(2) of the law exempts smallholder agriculture (with land holdings less than 2 ha) in public irrigation schemes from this fee. For other water users, the fee is determined by the volume of use and their economic capacity (i.e. affordability). The application of this new fee is still to be regulated by the issue of a Government Regulation. In principle, this would become an additional source of revenue from non-smallholder irrigation and other customers of PJT I and enable it to meet more of its O&M expenses. This, however, depends on whether: (a) the various levels of government agree that this fee may be added to the existing tariffs; (b) a portion thereof is not claimed by provincial and local governments in the form of 'retribusi'; and (c) proceeds thereof are not to be included in the balance sheet surplus to be transferred to MoF.

6.7 Water Monitoring.

PJT I monitors hydro-meteorological data, water use, water quality, and financial data. During the dry season, it monitors the operation rule issued through the PTPA every 10 days to verify that the pattern follows predictions. PJT I does not manage all intakes; intakes for hydropower plants, municipal water supply, and some irrigation areas are managed and flows monitored by the water users themselves or by other provincial/district agencies. Some industrial intakes use water meters. Water use is estimated for those industries that do not use meters. Those users that pay do so on a volumetric basis after they have received the water.

During the rainy season, PJT I focuses on flood management, monitoring rainfall intensity and discharge along the Brantas River through the Flood Forecasting and Warning system. For basin wide monitoring of water quality, the Provincial Water Resource Services Office collects water quality data from the Balai PSDAs, as well as data from PJT I, and reports it each month to the Governor. PJT I monitors water quality, collects data, and reports to the Bappedalda Office (Provincial Environmental Control Office), who, in turn, require concerned agencies and local police to enforce pollution control regulations and/or seek the legal remedies available.

PJT I is currently constructing a real-time water monitoring system on water quality. They monitor pollution from a central station in Lengkong Mojokerto, and have constructed a lab in Malang that is awaiting certification. According to the head of an advocacy organization that works on capacity building activities in the basin, 14 industries discharge polluted water in the Brantas, and thus far they have taken one to court using monitoring data from PJT I. However, though PJT I's data is technically sound, their data has no authority without official certification, so currently the court tends to be in favor of factory data. Why such certification has not been issued by KLH or local environmental agencies is not clear.

Communication

PJT I is very proactive in providing information concerning water resources management and issues. Staff disseminate brochures and participate in exhibitions each year for local government and in Jakarta. Some local governments invite them as speakers as well.

They seek local TV and radio exposure regarding water issues and open discussion forums. PJT I supports research and seminars at the University of Brawijaya and at the University of Education, Malang in the areas of agriculture, basic science, and engineering. They maintain a website with real-time information concerning pollution levels and water levels assessed at various locations of the basin, obtained through their monitoring activities. Senior management of PJT I actively participate in national and international seminars to provide information and highlight issues related to IWRM and actively promote in the corporation's management the best practices gathered from other basins. Since decentralization reforms have been in place, staff of PJT I feel as though they have to re-promote PJT I as an organizations because too many local government officials who are newcomers are not aware of who they are and their functions.

At this time, the Provincial Water Resources Committee (PTPA) is a public accountability mechanism, through which PJT I reports water balance information to governmental entities representing stakeholders. Though some stakeholders participate (PDAM, PLN), they are not considered to be official members. PJT I receives feedback concerning sedimentation and water quality problems within the PTPA, but for the most part, it is a forum to discuss water allocation decisions. In the new water law, representation in PTPA and PPTPA is to be balanced between the government and non-governmental agencies, and they will have a broader role much more than just water allocation. These committees will become coordination bodies where decisions on management policies (planning, implementing, supervising, controlling, and funding) are to be made.

7. Analysis

In this section we will analyze how the previously identified analytical factors deemed to affect the outcomes of decentralization of river basin management structures have affected the Brantas basin and the performance of its management system since the institution of the PJT I.

7.1 Contextual Factors and Initial Conditions

The steady economic growth during the Suharto regime came to a dramatic halt with the 1997 financial crises, coupled with the collapse of the autocratic regime. Indonesia's weak institutions, a poor legal and regulatory framework, ineffective bureaucracy, and endemic corruption made it difficult for Indonesia to withstand political uncertainty and an economic downturn. The effects of the crisis upon Indonesia were worse than for many of its Southeast Asian neighbors. The Government launched a four-pronged strategy of policy and institutional reform based upon macro-economic management, financial and corporate restructuring, protection for the poor and of human assets, and reform of economic instruments and institutions. A number of donor agencies jointly participated in an IMF-led restructuring program in FY1998-1999. The program has included policy, legal, and institutional reforms in a number of public service sectors, including the water resources sector. Since 1999, the country has gradually recovered macroeconomic and political stability, but it is still vulnerable and limited in its capacity to obtain development funding. The IMF program, terminated in December 2003, has been replaced by economic recovery policies by the Indonesian Government. It is within

the context of these economic constraints that proactive institutional change in the water sector is being carried forward at the national level.

Two distinct phases can thus clearly be distinguished in the macro context of Brantas basin management. First, PJT I was created during the Suharto regime, indicating that the previous government realized the need for a better approach to ensure management, operation and maintenance of the infrastructure created by the Brantas Project. While the creation of PJT I constituted a modicum of decentralization in the form of devolution of national government responsibility through deconcentration of administration, it has still been dominated by the central government. The second phase, which is characterized by democratization in recent years, places more emphasis on stakeholder involvement and the recent decision reorganizing steering and water resources committees reflect this trend. The autonomy and decentralization laws put a greater pressure on PJT I to be answerable to the regional Governments (Provincial and Districts) in many aspects of basin water management. Thus, the political and economic macro contexts have had a clear influence on Brantas basin management and have conditioned the way it has worked out. An interesting point is that even under a centralized regime, a certain devolution of management decision making to the river basin level was possible. This provides an example for other countries that have strong centralized structures, but may be considering more effective basin-level water resources management.

7.2 Characteristics of the Decentralization Process

Indonesia's 1945 Constitution, hastily drawn up at the time of its independence, bestows strong powers upon the executive branch, giving the President the authority to determine the nature of regional autonomy. The pursuit of a strong unitary government has historically been an executive response to the sprawling archipelago's extremely high level of cultural, ethnic, language, and economic diversity. During his New Order reign (1969-1998), General Suharto consolidated powers at the center and reduced or eliminated resisting elements in society. Provinces and districts, established through Law No. 4/1974, were held in check through very clear subservient roles in the name of maintaining national unity. The Central Government set policies and regulations, provinces undertook coordination and supervision duties as agents of the center, and districts were responsible for implementation. In time, over 90% of government revenues were accrued to the center, and large conditional central transfers limited local autonomy. (Ferrazzi 2000). In 1998, immense student pressure and general unrest forced Suharto to resign. The 1997-1998 financial crisis, attributed to extensive government corruption and weak institutional development factored into this. Law No. 22/1999 on Local Government devolved Central Government powers and responsibilities to district-level governments in many administrative sectors.

Given the history of centralization and interest in maintaining political stability and continued unification, decentralization of water resources management authority, though involving a "big bang" event to initiate it, has in practice embodied an iterative shedding process, such as we have observed in the case of the Brantas basin. The decentralization process was clearly top-down. Interestingly, even with this process key water users and stakeholders adhere to PJT I's "rules", i.e. payments of water use fees, which permit the company to function. As pointed out above, these stakeholders –

notably industries and municipalities – do have an interest in a functioning water delivery framework and, are overall willing to contribute to it (albeit not sufficiently to cover full operation and maintenance costs of the system). An important contributing factor to this relative success of the PJT I seems to have been its outreach capacity towards stakeholders, indicating that a well-managed decentralization process can yield good results if communication with key stakeholders is established, both through formal and informal channels, and when they see tangible benefits. – This reasoning also holds when comparing it to the Brantas basin’s pollution problems where, up to now, no stakeholder is actively contributing and where political pressure has not yet been strong enough to (i) implement the polluter-pays-principle, nor to (ii) designate one organization with adequate legal authority and incentive to deal with pollution and the economic pressures and commercial interests that cause it to continue. With pollution not affecting the main water users (industries and farmers) and municipal and district governments being notoriously weak in the face of economic growth and employment generation imperatives (and possibly having more incentives to build trans-basin schemes or wastewater treatment plants rather than going for “soft” regulatory solutions), it is a difficult-to-resolve issue where incentives are not yet adequately set.

With regard to the future outlook, the passage of the new Water Law distinctly signals Central Government commitment to continued reform of the water resources sector in accordance with the agreed action plan developed under the World Bank assisted Water Sector Adjustment Loan (WATSAL). The Law was initially drafted in 2002 and underwent a great deal of debate and discussion both inside and outside of Parliament before its passage in March 2004. The amount and length of debate prior to the law’s passage was due to a lack of consensus among agencies and legislators concerning particular issues, such as extent of irrigated farmer protection, the privatization of certain water resource service functions and the establishment of transferable water use rights. Strong disagreement over particulars of the decentralization process may very well prove divisive to Central Government commitment to a fast roll-out of decentralization reforms through future governmental transitions. However, that dialogue and debate are taking place openly among a broader set of actors in Indonesian society - that legislators and members of civil society are participating in in-depth dialogue with Central Government Ministry actors – reflects that in the larger sense, reforms have been implemented and are being exercised. The resulting revision of the autonomy and fiscal decentralization laws in September 2004 has to some extent harmonized views on decentralization by providing a say to the central and provincial governments on issues of autonomy and fiscal decentralization.

7.3 Characteristics of Central Government/Basin-Level Relationships and Capacities

The Continued Role of Central Government

Much power still resides with Central Government ministries for planning and policy-making within strategic river basins like the Brantas. The authority to oversee the management and functioning of PJT-I lies with the center through Ministry of Public Works with the Ministry of Finance exercising the fiscal oversight role. In accordance with Water Law No. 11/1974 and Law No. 7/2004, the MPW has supervisory control of PJT I. The Supervisory Board of PJT I, with five members from Central and Provincial Governments, undertakes general supervision of PJT I’s program, work plan, and budget,

and answers to the Ministry of Finance and MPW . The Supervisory Board does not have a stakeholder advisory group to work with or any other form of stakeholder institution overseeing its policies and performance (although this may change with the advent of a Basin Water Resources Council). It structurally reflects the authority of the MPW and Ministry of Finance over basin-level interests. The Governor of East Java however also sits on the Board, which helps to facilitate coordination and implementation locally.

PJT I as the Executing Agency

PJT I is responsible for operating, maintaining, and managing water resources on behalf of the Central Government, which is the owner of the infrastructure in the Brantas basin. The infrastructure assets have not been transferred to PJT I nor are they given on a concession basis because of PJT I's limits to adequately finance large-scale construction and rehabilitation. Government Regulations very specifically delineate PJT I's activities. PJT I is assigned to plan and operate day-to-day activities, maintain records, undertake minor maintenance, and assume responsibility for operational management. The company can undertake some rehabilitation activities within its financial limits that are necessary for operational purposes. Any subsequent changes or expansions to these activities through Ministry of Public Works decrees have been introduced to suit ministry needs or water resource conditions within the basin (such as for PJT I's water quality monitoring capacity), without offering any changes in authority roles, responsibility, or financing mechanisms. This is consistent with how Decentralization Law 22/1999, which provides specific functions for local government without general authority or new means of raising revenue, an aspect that is covered under the Law on fiscal balance between Center and Region No. 25 of 1999.

While all the above depicts a de-concentration rather than decentralization of Central Government activities to a basin level institution to serve national-level objectives and local level interests, it must be understood that in the context of a unitary country holding objectives of fiscal recovery and political stability, decentralization is undertaken more carefully, and particularly so within the Brantas basin. The central government maintains a large degree of authority over PJT I's financial and decision-making functions because it is in their interest to manage the Brantas PJT I. Large water infrastructure projects with high cost investments involve Central government responsibility for loan repayment. The ability of regional and local government to raise that level of revenue is generally not there, and the Governor's priorities may differ from the Central Government's sectoral interests.

In light of the current institutional set-up, PJT I does not have a lot of autonomy to create and modify institutional arrangements to better suit its needs and circumstances, but it nonetheless uses its entrepreneurship and interest in outreach to garner support for particular objectives where it can.

Local Basin Stakeholders

Prior to decentralization reforms, service provision was vertically managed through deconcentration of central government responsibilities. Given the centralizing force of Suharto's New Order government and the deconcentrated role of regional government, there was little stakeholder involvement or coordination made in decision-making,

implementation, or monitoring. Some government offices, such as implementation offices, boards, regional secretariats, and technical units were under the administrative authority of the Province and funded from the APBD (regional budget), which partly served on behalf of the central government. Other government offices were under the administrative authority of the Central Government and funded by its APBN (central budget), which operated within a particular province, district, or municipality, such as Central Government field offices. Decentralization reassigned deconcentrated civil servants to the regions. Thus, while there was experience in service provision as funded through central government coffers, there was little experience with self-governance (fiscal autonomy, devolution of authority, stakeholder involvement) at the local or regional level.

Likewise, with the water sector, the Central Government used relevant line agencies, government corporations, or experts as stakeholder voices to obtain input. Stakeholder participation in water sectoral activities was limited to irrigation farmers' participation in WUAs, and this too not vigorously pursued in terms of enabling real community empowerment. Thus, prior to the 1999 reforms, experience in service provision existed at the local level, but with little experience in self-governance. Much experience is still to be gained to effectively involve stakeholders, raise funds to cover costs, horizontally integrate water resource management activities, and undertake planning and policy-making at the basin level.

Indonesia being a unitary country that had until recently been centralized, basin-level stakeholders do not generally have a high level of influence upon central government actors, but there are degrees of relative influence among basin stakeholders, particularly where central government has a stake in their operations. PLN (Power Corporation) and PJT I are state-owned companies that have direct relationships with Central Government ministries. PDAMs are local-government-owned companies that draw raw water via supply systems constructed by MPW. A second means by which stakeholders are endowed with national-level political influence in this setting is where the basin stakeholders' interests fit the interests of the basin's Master Plan, which serves Central Government long-term interests.

Irrigation farmers were the central focus of Master Plans I and II. The lack of influence of irrigation farmers among national level policy makers towards basin management and achievement of rice self sufficiency in 1984 (a national goal) may be the reason that Master Plans III and IV took on a new focus: urban and industrial development and integrated water resources management. As such industrial interests may now have center stage as compared with irrigation, particularly in the post-fiscal crisis era, where economic recovery has been an imperative.

Decentralization reforms in Indonesia are continuing to be customized according to ongoing lessons learned. Time and experience has certainly contributed to PJT I's legitimacy as an operator within the Brantas river basin. PJT I has developed strong relationships with various stakeholder groups, universities, and NGOs and is well trusted to manage water supply and flood control issues. While there is still considerable ground to cover regarding broader and more direct stakeholder involvement as well as coordination and integration across agencies, it appears as though there is a general sense of expectation and enthusiasm among stakeholders regarding the direction toward which

institutional and policy changes are heading. There also appears to be a realistic understanding that implementing decentralization is a lengthy and iterative process.

7.4 The Internal Configuration of Basin-level Institutional Arrangements

PJT I is a notable organization in a river basin management context because it is a state-owned *company*, with clearly delineated management responsibilities and a profit motive. This construct has permitted the company to (i) focus on the river basin as the management unit and (ii) focus on management rather than development and construction. Importantly, this set-up has also endowed the company with credibility that the funds it receives from water users will be reapplied in the basin, an important condition to ensure stakeholders' willingness to financially contribute to basin management expenses.

As outlined earlier in this paper, within its responsibilities, PJT I has been rather successful and the Brantas basin has turned into a well-known example not only in Indonesia but also in an international context of how water resources can be more effectively be managed at the river-basin level.

The weak point in the overall institutional arrangements is related to the fact that: (i) PJT I does not have a clear mandate and a management role with respect to the two more recent water resources management challenges in the basin, notably the high degree of point and non-point pollution as well as deforestation in the upper reaches of the basin, leading to major erosion problems; and (ii) it has not yet been given a management concession to undertake overall monitoring of effluent discharges, implement an effluent discharge fee and retain its proceeds to finance monitoring activities; and (iii) it has not been given a mandate to operate its reservoirs for low-flow augmentation to improve in-stream water quality while adjusting/reducing deliveries to other water users such as public irrigation schemes. The coordinative activities it must undertake in support of its water resource management objectives are consequently quite complicated and confusing. These weaknesses have not permitted it to address some of the important management issues, nor have these been picked up by other responsible institutions.

With the latest round of institutional reforms to be implemented, this situation may change. It indicates, however, that the rather centralized approach does not favor quick adaptation of the system to new decentralization and the political-economic dimension of socio-technical issues and challenges.

7.5 Other Factors

In each case study, there have been important factors relating to the emergence and success of basin management which were not envisioned in our analytical framework. This is in the nature of research on institutions, which are always shaped by particular contexts and therefore exhibit unanticipated or even idiosyncratic features.

One important factor in the success of the PJT I, which in its initial stage had to implement such unpopular measures as water use fees, seems to be a strongly dedicated staff and a succession of corporate heads who believed in a transparent and well managed company and who used strong communication skills to build the PJT I into a respected, well-functioning institution.

A further factor seems to have been the pragmatic manner of dealing with different water management challenges in the basin. While erosion and pollution problems already existed from the outset – if not as severely as nowadays – PJT I has focused on its basic mandate of good O&M rather than assuming many other responsibilities. On the one hand, this approach does not solve these problems, but it has permitted to deal with the first set of issues and create an effective institutional and organizational base before expanding into new and more contentious institutional problems. This stepwise, pragmatic approach may have been wiser than going for full “integration” of dealing with all water-related problems at the same time, an approach that sometimes does not lead to any solution and consequent institutional weakness.

Finally, with regard to the institutional changes currently underway, a rather significant factor in the Indonesian case is the existence of the water sector reform program, a reform package with substantial external assistance through the World Bank assisted WATSAL loan to pursue these reforms. Crisis is often a factor cited for instigating institutional change. This has been witnessed in a number of the case studies, where crises of water scarcity or water quality prompted the development of river basin management as an issue-level response. Indonesia’s profound political and economic crisis in 1997-1998 required an immediate and large-scale multi-sectoral response. This crisis prompted the *Reformasi* Government to seek external assistance from the IMF and a number of donor agencies to design and finance an ambitious reform agenda in a number of sectors. In 1998, the World Bank approved a US\$300 million three-tranche Water Sector Loan (WATSAL) to the Indonesian Government to provide balance of payments assistance in support of reforms in the management of the water resources and irrigation sectors. In 1999, the Indonesian Government initiated a major sector reform program that embodies four main objectives under the WATSAL project. This loan is part of the IMF recovery package for Indonesia and was terminated as of December 2004. Parts of this water sector reform has been included in the 100 day Action Plan of the new Government inaugurated in October 2004.

The new Water Law, passed in March 2004, is a major water sector reform to replace the original Water Law of 1974 and all its related regulations in all areas and all levels of water resources management. It addresses a number of existing institutional shortcomings in the achievement of integrated water resources management. Several Government Regulations have been drafted to support the new Water Law. The completion of the water sector reform in 2005, including the implementation of the new Water Law, is expected to enable real decentralization of authority in basin WRM. Many of the shortcomings to the current institutional arrangements are addressed in upcoming legal instruments and reform activities. Considerable changes in the water sector are underway, consequently creating significant uncertainty at all levels of governance and government. But the transparency of the overall reform agenda and its sustained progress has provided direction for all levels of government and civil society, fostering dialogue and preparing for institutional change.

8. Stakeholder’s Motivations, Incentives, and Actions

The purpose of this research project is to examine when and why “river basin management at the lowest appropriate level” works in practice. From the above, it has

become clear that, while the establishment of the PJT I certainly was a devolution of decision making to a lower level, it did not constitute a full decentralization, but a deconcentration of power. It is clear that the different stakeholder groups have varying interests in further decentralization and their motives, incentives and actions in this regard are examined in this section.

8.1 Water Users

Water users' main interest is adequate – and cheap - quantities of reliable water supplies of satisfactory quality. This shared interest among competing user groups can result in conflict in times of water scarcity. For instance, sugarcane factories take 33% of total industrial demand, and much of sugar cane crushing takes place during the dry season. Thus in low-flow years, irrigation supplies are diverted to meet industrial demand, and this results in crop losses. Water users thus have an interest in a well-managed allocation process as well as in a process ensuring adequate water quality and in-stream standards for their respective purposes (which however vary).

Hydropower (PLN) is most interested in reliable water supply as well as sediment control for its operations. PLN directly participates in the PTPA, and obtains its allocation with little or no conflict with other consumptive users, although their required reservoir water release patterns for hydropower generation may create problems for a reliable irrigation water supply in the dry season.

Municipal suppliers and industries that must treat water for production, find the issue of water quality to be equally important to supply. Degraded water quality forces them to assume higher production costs. They must either pass these costs along to consumers or reduce production (or service coverage in the case of PDAM) to remain profitable. The municipal water supplier Surabaya PDAM has little control over sewerage discharged in the upstream reaches or the sources of effluents that seriously degrade the quality of water it treats to drinking standards. The high costs of treatment consequently prevent them from meeting existing demands in Surabaya, posing a serious threat to public health, particularly for poor residents. The lack of clear authority and coordination to effectively address water quality degradation issues in the basin translates to high long-run operation costs for a treatment plant, making other high-cost water transfer projects from distant springs an attractive option.

Those stakeholders, such as PLN and PDAM, which have a close working relationship with PJT I, are content with PJT I's performance in water supply and flood control and believe its relationship with the central government to be an asset. They generally commend PJT I for the initiative that it has taken towards sediment and pollution control, recognizing that these issues are not entirely within PJT I's control. They see the need for PJT I to have greater authority to coordinate solutions to these problems.

A few stakeholders, such as irrigation districts, which interact directly with provincial offices, might believe that PJT I's functions could be better handled by the province for more effective coordination with the objectives of the Governor, who is ultimately responsible for issues of water pollution, flood control, issuing licenses, etc. Irrigators have the perception that PJT I, because of its dependence on revenue generating water users, is to some extent not able to safeguard their interests. This is compounded by

the fact that there currently is no formal institutional mechanism for irrigators to dialogue with PJT I.

8.2 Brantas Basin Corporation (PJT I)

PJT I is most interested in carrying out its functions successfully and recovering costs through revenue. It is charged by MPW with managing, maintaining and operating infrastructure in the 40 major tributaries and rivers and carrying out tasks to help allocate bulk water, manage and protect the basin from floods, manage water quality in the streams and help conserve the watershed. As a state corporation, it is charged with showing a fixed return on investment (PJT I is designated as a *Perum* that by Law cannot make profit in the business sense but must balance its costs and revenue budgets each year) in order to continue operations. Thus, it searches for opportunities for increase of revenue, whether it be through water user fees or non-water services. PJT I is currently interested in developing capacity to collect fees from polluting industries to provide another source of revenue, which it also has the legal basis for. Aside from raising revenue, it also limits expenditure from reducing operational costs by limiting the amount of O&M it plans. PJT I staff recognize this conflict of interest between these two roles and work to balance responsibilities. However, as exemplified in the case of the irrigation sector, water users who do not pay a fee and whose interests are not part of the objectives of the current Master Plan – and thus do not contribute to either of PJT I's areas of responsibility – might have lower priority in the water allocation decision-making process without an explicit institutional mechanism to bring their interests to the table (such as the proposed apex WUAF representation on a Basin WRM Council).

PJT I staff have an interest in portraying PJT I as professional, unbiased, and expert in the areas that it is responsible for. This assists its coordinative role with stakeholders, both at the basin and provincial levels while the central government considers it a legitimate authority for the activities it carries out. It is through this coordination approach and proactive management style that PJT I develops good working relationships with formal and informal institutions to be effective in many aspects of WRM.

Though PJT I does not have much authority and autonomy, being closely supervised by the central government, there is a strong incentive for staff of PJT I to want it to remain under Central Government authority. The MPW is instrumental in the appointment of PJT I's directors, and about 100 central government employees have been transferred to work for PJT I. It is in the central government's interest to transfer individuals who likely have water resource management experience and expertise to operate and maintain their infrastructure. PJT I also has access to a larger amount of funds for project development than would be available through Provincial affiliation. PJT I can afford to pay its employees twice as much as employees in line agencies of public works sectors, attracting better skilled applicants. These employees feel that they can rotate into other responsible positions in the central government system if they perform well. These factors contribute to prestige and legitimacy at the basin level among stakeholders, who consequently tend to support PJT I activities and comply with its decisions.

PJT I was established before decentralization reforms took place, under a different set of interests than local autonomy. That its assets have not been transferred has not been challenged. On the other hand Provincial Government may not wish to exercise ownership over the assets because of financial needs for the upkeep of the infrastructure. PJT I's long-term master plan (1999-2020), prepared with JICA's assistance, indicates that PJT I would like to expand its responsibilities. One recommendation is to discontinue the Brantas Project Office and take on its role. It would also like to assume the role of the Volcanic Project Office, which is another central government line agency. PJT I has the legal basis for taking these responsibilities on, but implementation is dependent upon financing and viability to receive sub-loans. The question would remain if PJTI can be an effective water manager while taking on the role of implementing major water and volcanic debris control infrastructure as recommended by the JICA study. Also, MPW has had a longstanding role in water resources infrastructure development and has not been interested in devolving this function.

Expanding its core responsibilities in a realistic manner gives PJT I greater influence as an official basin management entity, using its expertise to assist the Central Government in managing other strategic basins. Through a Presidential Decree in 2002 the PJT I has been given the additional responsibility to manage the Solo River Basin that straddles East Java and Central Java provinces, which may later be spun off as a BUMN Corporation. PJT I staff conduct their activities with the understanding that PJT I is a pilot whose model will be proliferated if successful. This perspective justifies central government authority of PJT I, as they see the central government jurisdiction as better for transferring knowledge from the PJT I pilot to other basin projects.

8.3 The Province

Provincial agencies are interested in increasing their budget and authority in water resources management. Their interests are larger in scope as they coordinate and regulate many operational tasks. As such, they are currently financially limited to deal with basin management. However, according to the new Water Law, river basins that lie inside a province and are not nationally strategic should be managed by the Province, and Provinces throughout the country are interested in eventually being able to manage their basins and generate water service revenue through regional basin management corporations (BUMD). They are wary of central government interests to dominate river basin development in areas of greater revenue raising potential, which circumvents their opportunity to receive funds. However, the Provincial Governments do not currently have the capital to fund the BUMDs. As such, while the central government has plans to create four more PJTs (Bengawan Solo, Serayu-Bogowonto, Jratuseluna, and Jeneberang) it must do so with an ear to Provincial-level support and legitimacy. It is more politically viable at this time to have branches of PJT I operate in these river basins for short periods, given its financially prudent track record, than to create new organizations, such as a PJT III. Provinces should be given time to decide on making these into BUMD PJTs or permit central government to upgrade these PJTI branches to become independent BUMN PJTs.

Though decentralization reforms have transferred operational-level authority to regional governments, the central government maintains a large degree of control over policies to guide operations. The Ministry of Public Works has been long involved in

the infrastructure development, but came to recognize the importance of O&M, river channel improvement, and a strong basin-wide organization to manage its infrastructure. Since it can more easily obtain development loans to finance large construction projects than local level institutions, it has a particular interest in maintaining authority in basins whose economic development serve national interests. Provincial interests embodied by the Governor--no matter how legitimate (efficiency, local control and revenue)--can conflict with central government objectives if authority is devolved to the province; hence the MPW 's interest in retaining full financial control and bureaucratic power.

The Provincial Governor's position was previously that of a direct appointment of the Indonesian President, serving as a central government representative within the region. After decentralization reforms, this position has the capacity for more local autonomy. Beginning in mid-2005 it is a position that must be filled through a popular election process and not confirmed by the President after being elected by Provincial Parliament as at present, endowing the office with more localized interests. In WRM, the Governor is given much authority for operational-level regulatory issues (licenses for abstraction and discharge, water pollution control, flood control, tariff setting etc.), but currently has marginal influence upon basin level policy-making in the PJT I case (a nationally strategic basin). The Governor sits on PJT I's supervisory board, but this serves local coordination purposes. The central government maintains authority over Brantas basin policy making, technical supervision and financing through directly supervising PJT I's objectives, proposing tariff rates for differing sectors, financing flood control and rehabilitation activities, and so on. Thus, there are a number of reasons for the provincial government to be interested in further decentralization of basin decision making to the provinces, similar to other countries with federal structures, such as Brazil, Spain or the United States where states and provinces seek local decision-making powers over water.

8.4 District-level government

District level government actors are gaining a sense of their newly devolved authorities. They see themselves as equal to province-level actors, and as such it is difficult for the Province to coordinate activities across districts. At this early stage, in light of many new responsibilities, local government actors are less likely to recognize their role in issues that are of a larger scale, involving negative externalities, as is the case with river basin management. Thus, coordination, information provision, outreach, and education are necessary to assist the district-level heads (Bupatis) to recognize their interest in actively participating in water resource management. Some amount of role sharing or deconcentration of responsibilities in basin management functions from the national government and the province can be anticipated, provided the higher level foots the bill in financing the activity.

8.5 Central Government

Given the economic importance of the Brantas basin as well as the huge investments it has benefited from in the last decades, the central government has strong incentives to keep strategic decision making power over the basin. While the PJT I can take day-to-day management decisions, it has no authority over major investment decisions and neither has the province, thus keeping the central government firmly in the driver's seat. While

the current democratization of Indonesian society is clearly moving towards more participation by stakeholders in water resources management, the central government's overall incentives are to keep control over key decision making issues, especially those related to financial control and administrative authority.

9. Conclusion

The Brantas basin case demonstrates a number of important features, which make it unique on the one hand, and provide interesting generic insights for river basin management on the other hand. These include:

- A proactive central government undertaking decentralization reforms, i.e. a “top-down” generated approach, arising out of the recognition that water resources management activities best be undertaken at the basin level in order to achieve sustainable results.
- Creation of a state-owned semi-profit making corporation (Perum) with clear management, rather than water infrastructure development objectives, with a motive to balance revenue and expenditure while providing an attainable fixed return on limited commercial activity assets (to be paid to the central government) and with a subsidy for O&M of its hydraulic infrastructure providing public goods such as flood control etc.
- A succession of “champions” within the PJT I and its basin management approach.
- Within these innovative institutional arrangements, a number of water management instruments are in place and actively being implemented: annual water allocation based on a functioning monitoring system; existence of limited water use rights in the form of licensing of commercial water uses; and financial instruments such as volumetric water use fees; a well established in-stream water quality monitoring system. There are a functioning flood warning system and effective flood management. However, there are no instruments for water pollution control in place.
- Continued external donor financial and institutional development assistance through the national government that can afford the costs and expenditures involved, i.e. there is no full financial autonomy.
- With changing economic and environmental conditions in the basin, there is insufficient authority in PJT I to manage and coordinate larger integrated water resource management issues such as water quality and watershed management at the basin level. PJT I is, nonetheless, successful with respect to tasks it is most directly responsible for. It uses the legitimacy it has gained through successful management to coordinate institutions in areas over which it has less control.
- Due to the novelty of the decentralization process, which is implemented in an iterative manner, there is still confusion in the relationships between many central, provincial, and local government actors. Also, many new coordinating bodies have been created, but there is as yet little clarification concerning authority. Pressing issues such as water quality and catchment management

suffer from this problem of fragmentation of authority without clear coordination. The new Water Law provides clarification and guidance regarding roles and responsibilities.

- Structure of representation matters, and as stakeholders are, to date, represented by government actors in water resource decision-making, their interests are not directly voiced. This is expected to change as participatory coordination units are developed at the national, provincial, and basin levels.

Overall, water resources management in the Brantas basin is on a positive track. The management level in the basin compares favorably with many other river basins worldwide even though much still remains to be done and challenges keep growing. One of the ways chosen by the government to further improve basin management is to drive decentralization forward and to more actively involve key stakeholders including at the sub-national level (the province and districts) and actual water users (rather than their representatives at the sectoral government level). At the same time, however, the government continues to consider the Brantas a strategic basin and is keeping its overall powers.

In practice, the decentralization process has been gradual and still largely reflects top-down arrangements: central government as policy maker with an executing agency as the implementer and with local government in an intermediate position. Decentralization in Indonesia has focused on devolving authority directly to district-level actors and this has created some level of confusion concerning relationships among and degrees of authority between the many central government, provincial, and local actors with overlapping responsibilities. There is a move to provide the provinces more authority in the decentralized framework as the revised Law on Autonomy and Fiscal Decentralization of 2004 is implemented.

Current reform activities are ongoing and weaknesses and strengths are being assessed with respect to the Indonesian context. The new institutional developments promise greater national level coordination, clearer provincial-district-basin level jurisdictional relationships, and expanded stakeholder involvement at all levels. Experience is accumulating through the development of different forms of basin institutional arrangements. Though there may be disagreement among central government actors as to how and how quickly decentralization should be rolled out, there is growing enthusiasm on the part of provincial and local government actors and civil society for further reform of water resources management institutions. A key challenge in this process will be to develop the capacity, both fiscal and managerial, of the regional governments and to bring in stakeholders in an effective and productive way to tackle the major problems that the basin still faces. Participation by itself will not solve these issues, but needs to be targeted and provide stakeholders with clear incentives to work towards solutions.

Appendix: Variables in the Analytical Framework

The analytical framework used for this research project entails several variables hypothesized to be related to the success or failure of river basin management institutions, grouped into four categories.

- *Contextual factors and initial conditions*—The literature on decentralized water resource management indicates that successful decentralization is at least partly a function of the initial conditions that prevail at the time a decentralization initiative is attempted. These initial conditions are elements of the social context of the decentralization effort. They include
 - Economic development of the nation;
 - Economic development of the basin area;
 - Initial distribution of resources among basin stakeholders; and
 - Class, religious, or other social/cultural distinctions among basin stakeholders.
- *Characteristics of the decentralization process*—In countries that have attempted to decentralize water resource management to the basin level, characteristics of the decentralization process itself will affect the prospects for successful implementation. Two necessary conditions of a decentralization initiative are (a) devolution of authority and responsibility from the center, and (b) acceptance of that authority and responsibility by the local or regional units. Whether (a) and (b) occur will depend in part upon why and how the decentralization takes place. Important factors include
 - Whether basin-level management was a local initiative to assume management responsibilities, a devolution that was mutually desired by local stakeholders and central government officials, or a decision by central government officials to shed water resource management responsibilities regardless of whether basin stakeholders wanted to assume them;
 - The extent of central-government recognition of local-level basin governance; and,
 - Whether central government officials maintained a policy commitment to decentralization and basin management through transitions in central government administration.
- *Characteristics of central government/basin-level relationships and capacities*—Because successful decentralization requires complementary actions at the central government and local levels, other aspects of the central-local relationship can be expected to condition that success. Political and institutional variables should be

explored that relate to the respective capacities of the central government and the basin-level stakeholders, and the relationship between them. Key factors include

- The extent to which devolution of water management responsibilities from central government to basin institutions has been real or merely rhetorical, and whether devolution has been handled as a supportive transition to basin management or as an abrupt abandonment of central government authority;
 - The financial resources available to basin-level institutions, and the extent of their financial autonomy;
 - Basin management participants' ability to create and modify institutional arrangements that are tailored to their needs and circumstances;
 - The extent of other experience at the local or regional level within the country with self-governance and service provision;
 - The distribution (particularly asymmetries) of national-level political influence among basin stakeholders;
 - Characteristics of the water rights system in the country which facilitate or hinder basin management efforts; and
 - Whether basin-level institutions have had adequate time for implementation and adaptation of basin management activities.
- *The internal configuration of basin-level institutional arrangements*—Successful implementation of decentralized water resource management will also depend on features of the basin-level arrangements created by stakeholders and/or central government officials. Important ones include
 - The presence of basin-level governance institutions;
 - The extent of clarity of institutional boundaries, and their match with basin boundaries;
 - Whether and to what extent basin-level institutional arrangements recognize sub-watershed communities of interest;
 - The availability of forums for information sharing and communication among basin stakeholders;
 - The ability to make, monitor, and enforce contingent contracts whereby basin stakeholders can agree to contribute to improvements in basin conditions;
 - The institutionalization of regular monitoring of basin conditions by means that are trusted by water users; and
 - The availability of forums for conflict resolution.

Certainly, these factors will not all apply with equal significance in all cases. In each case, the emergence and path of river basin management will be affected profoundly

by some of these variables, affected slightly by others, and not at all by some. Institutional analysis in a case-study setting consists largely in determining which institutional factors in what combination appear to have been linked to outcomes. Furthermore, many of the variables listed above have subjective components, and will be assessed differently by different participants and observers. It is therefore essential in these case studies that team members interview individuals with a variety of perspectives.

Terms and Abbreviations

Balai PSDA	Basin Water Resource Management Units
BAPEDALDA	Provincial Environmental Impact Control Agency
BAPPENAS	National Planning Agency
BUMD	Regional Government-Owned Enterprises
BUMN	State-Owned Enterprises
Dinas PUP	Provincial Water Resources Service Agency
GDP	Gross Domestic Product
IMT	Irrigation Management Transfer
IMF	International Monetary Fund
Kabupaten	Rural Districts
Kotamadya	Urban districts, or municipalities
MPW	Ministry of Public Works
MoF	Ministry of Finance
O&M	Operations and Maintenance
PDAM	Domestic Water Supply Company
PJT I	Brantas River Basin Corporation
PLN	State Electric Company
PPTPA	Basin Water Resources Committee
PTPA	Provincial Water Resources Committee
WATSAL	Water Resources Sector Adjustment Loan
WUA	Water User Association
WUAF	Water User Association Federation

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